

STRUCTURE OF THIS MICROCARD (BASIC INSTRUCTIONS)

A02 = How to use this microcard	1	2	3	4
A01 = Structure of microcard			SIS	
B01 = Trouble-shooting chart	A-***X*	X*XXX	XXXXX	XXXXX *XXXX X
	B-*XXXX	XXXXX	XXXXX	XXXXX XXX
	C-XXXXX	XXXXX	XXXXX	XXXXX XXX
	D-XXXXX	XXXXX	XXXXX	XXXXX XXX
	E-XXXXX	XXXXX	XXXXX	XXXXX XX
	F-XXXXX	XXXXX	XXXXX	XXX
	G-XXXXX	XXXXX	XXXX	
	H-			
	J-			
	K-			
	L-			
	M-			
N01 = Service information	N-*XXXX	XXXXX	XXXXX	XXX *X XX*
	12345	67890	12345	67890 12345 678
		1	2	

N28 = Table of contents and publication information

- 1 = Special features
- 2 = Safety and precautionary measures
- 3 = Testers and tools
- 4 = Installation position of components

- a. Read from left to right.
- b. Title of micropicture (appears on each micropicture).

E16	Product/component/test step	
	Coordinate	

c. Limits of section

Beginning	Mid-section	End	One-page section
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A01		=> <=
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USING THE MICROCARD

Trouble-shooting instructions for

System: Ecotronic with integrated ignition

Descriptions, photographs, terminal designations, and special features referred to the vehicle:

OPEL Omega with 1,8 l engine, 4 cylinders, (S 18 NV + E 18 NV engine)
Year of manufacture 10.86 ->.

These basic instructions provide detailed information on trouble-shooting. They must not be used as vehicle-specific instructions. Caution! Descriptions and photographs may deviate from the vehicle-specific brief instructions. Binding set values, terminal assignments, and special features should be taken only from vehicle-specific brief instructions. See microcard KFZ-001 for brief instructions.

A02		=> <=
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SAFETY AND PRECAUTIONARY MEASURES

Always observe safety and precautionary measures in order to prevent damage to the engine, control units or ignition coil, as well as to preclude hazards to persons.

CAUTION!

High-performance ignition system with dangerous high and low voltages!

Contact with voltage-carrying parts or terminals can be fatal (on both primary and secondary sides).

Prior to measuring compression disconnect the control relay in order to prevent undesired fuel preparation.

Do not short-circuit ignition coil term. 1 to ground (e.g. in order to shut off the engine). This would cause irreparable damage to the ignition coil and in some cases to the control unit.

Never connect the positive terminal of the battery to ignition coil term. 1. This would destroy the control unit.

When installing an alarm system follow the instructions provided in SIS microcard ALL-500. It is important to establish that the alarm relay is not subject to interference from outside fields (e.g. from ignition wiring), causing it to be activated incorrectly.

SAFETY AND PRECAUTIONARY MEASURES (continued)

Never start engine without battery being firmly connected (battery terminals bolted tight). Do not disconnect battery from the vehicle electrical system with the engine running.

Do not use a fast charger for starting the engine.

Render starting assistance only with a second 12 V battery and jumper cables.

Caution! Due to non-uniform requirements placed by vehicle manufacturers on electronic products, we do not recommend the use of 24 V batteries for starting assistance.

When charging the battery in the vehicle or rendering starting assistance, observe the directions given in the operating instructions of the fast charger as well as those provided by the vehicle manufacturer.

Prior to charging or fast-charging the battery, disconnect it from the vehicle electrical system.

Incorrect polarity of the supply voltage, e.g. due to incorrect connection of the battery or ignition coil, can lead to irreparable damage to a control unit.

Do not connect or disconnect the wiring harness from control units or trigger-box with the ignition switched on.

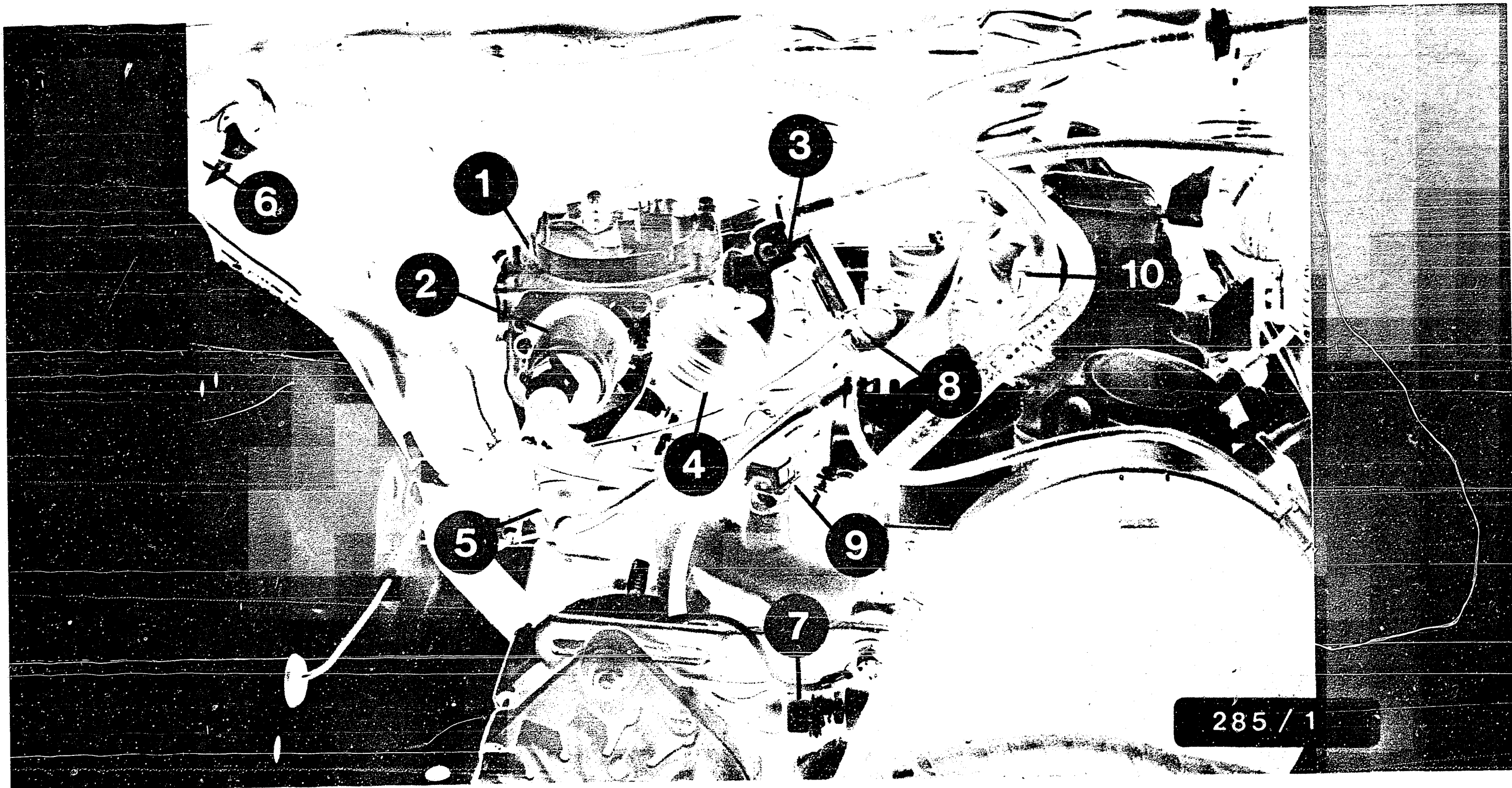
Prior to exposure to temperatures above +80°C (paint-dry installation) remove control units.

Control units must be removed before electric spot welding.

TEST EQUIPMENT AND TOOLS

Description	Designation	Part No.
Motortester	e.g. MOT 201	0 684 000 201
Calibrated infrared exhaust-gas tester	e.g. ETT 008.14	0 684 100 814
	e.g. ETT 008.15	0 684 100 815
Pressure-vacuum tester	e.g. ETT 007.01	0 684 100 701
Feeler gauge for adjust- ing throttle -valve sect. 3.15±0.05mm		Can be obtained from Korinth Ludwig-Kloos- Strasse 21 6450 Hanau 7 Steinheim West Germany
Measuring tool for throttle-valve adjustm.		
Vacuum pump	e.g. Mityvac	
Corrosion- protection agent or Uni spray "Termal"	WD 40	Commercially available
Electrics tester or multimeter	e.g. ETE 014.00 or Fluke 75 or Fluke 23	0 684 101 400 Commercially available.

For production reasons:
continued on the following
coordinate.



285 / 1

INSTALLATION POSITION OF COMPONENTS

- 1 = Carburetor
- 2 = Choke-valve actuator
- 3 = Throttle-valve positioner
- 4 = Vacuum unit, stage 2
- 5 = Throttle-valve potentiometer

- 6 = Diagnosis plug
- 7 = Temperature sensor, coolant
- 8 = Exhaust-gas recirculation valve
- 9 = Temperature sensor, intake manifold
- 10 = Plug connection, reference-mark sensor

INSTALLATION POSITION OF COMPONENTS (continued)

The Ecotronic control unit with integrated ignition is installed in the right footwell beneath the covering (upper illustration). In the illustration, the covering has already been removed. For the purposes of octane-number adaptation, in vehicles with the S 18 NV engine a code strip is located in the wiring harness (upper illustration, 1) and in vehicles with the E 1 NV engine a coding plug is installed in the engine compartment on the right behind the spring-strut dome.

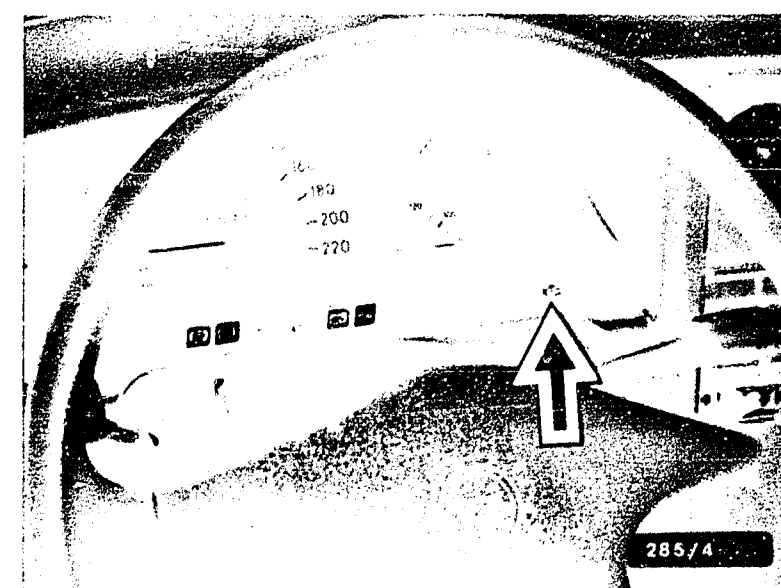
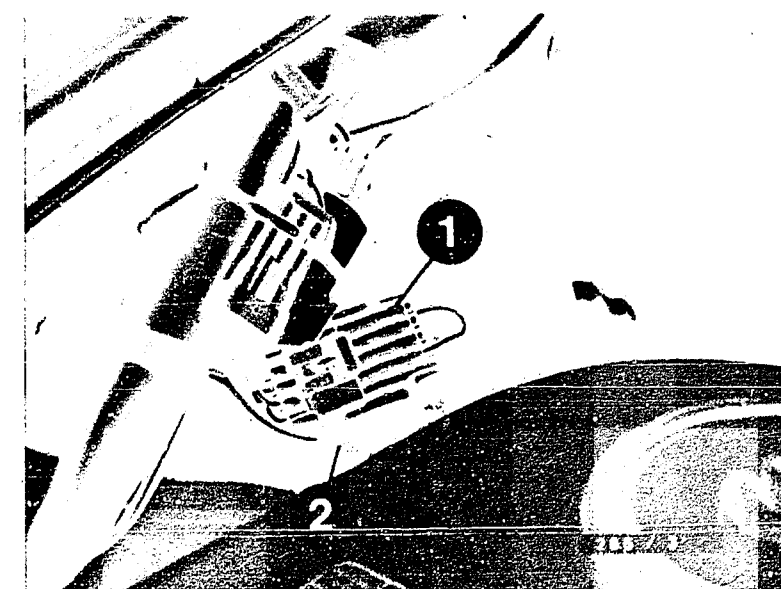
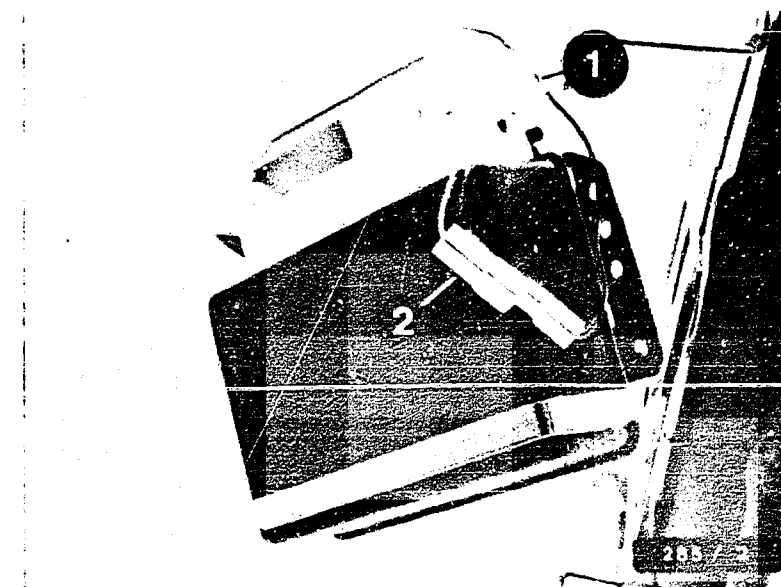
The idle speed can be increased by about every 100 min. -1 via the plug connection (upper illustration, 2).

The diagnosis plug is installed in the engine compartment on the firewall on the right (center illustration, 1).

Plug for CO adjustment (center illustration, 2).

If no CO tester is available with which it is possible to measure low CO values, make a plug connection for CO adjustment. The CO value is increased.

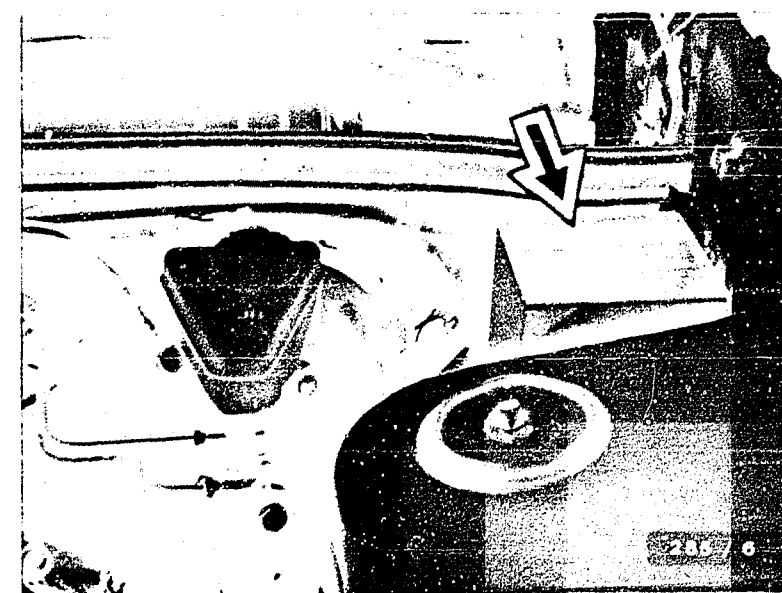
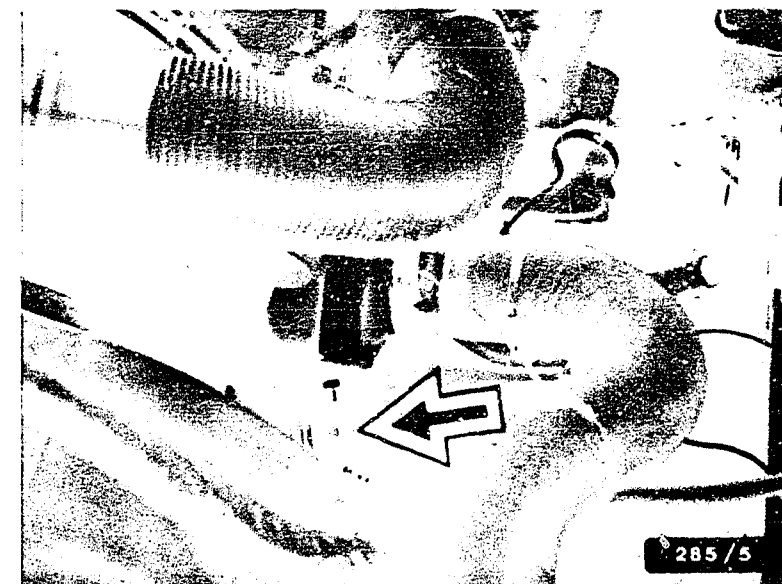
The warning and diagnosis lamp is installed in the instrument panel (lower illustration).



INSTALLATION POSITION OF COMPONENTS (continued)

The reference-mark and engine-speed sensor is mounted on the crankcase on the left as seen from the direction of travel (upper illustration, arrow).

The control relay and relay for intake-manifold preheating are installed beneath the cover (lower illustration, arrow).



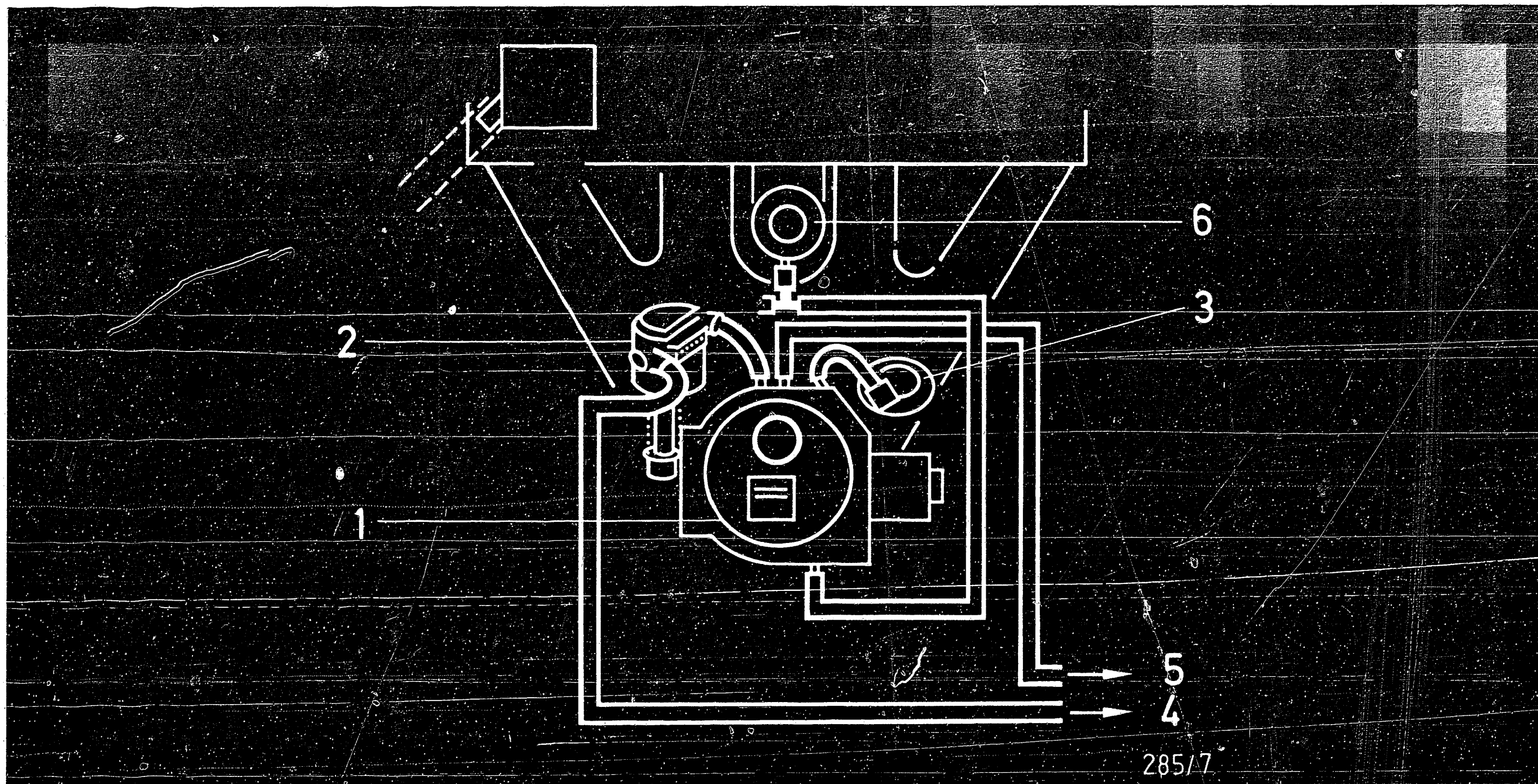


DIAGRAM OF AIR LINES

- 1 = Carburetor
- 2 = Throttle-valve positioner
- 3 = Vacuum unit, stage 2
- 4 = To air filter (clean-air side)

- 5 = To temperature regulator
for inducted air in air filter
- 6 = Exhaust-gas recirculation valve
(Only on Omega)

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM

The TROUBLE-SHOOTING CHART starts on coordinate B03 and contains customer complaints (fault symptoms) with several possible causes (component faults) in each case as well as coordinate references for detailed trouble-shooting. If no coordinate reference is given, this is a cause for which no test instructions are required.

Components that are checked by the self-diagnosis or with the universal test adapter are not listed in the trouble-shooting chart.

If the customer complaint is clear, proceed with trouble-shooting in the given order of possible causes one after the other and step by step.

Always start trouble-shooting with the self-diagnosis (if applicable) or with the universal test adapter (if provided). Only then continue with the trouble-shooting chart.

If the customer complaint is not clear, check all the causes listed in the trouble-shooting chart. To prevent possible incorrect measurements, check all causes in the order given (owing to the interlinking of test steps).

If the cause of the customer complaint has still not been eliminated after testing all possible faults, fit new prescribed ignition coil and/or trigger box/control unit.

HOW TO USE TROUBLE-SHOOTING CHART AND TROUBLE-SHOOTING PROGRAM (continued)

The TROUBLE-SHOOTING PROGRAM contains all system and component checks mentioned in the trouble-shooting chart. It is divided into three rows of boxes.

The left-hand column contains test instructions and set values.

The center column contains instructions on trouble-shooting and fault rectification.

The right-hand column contains the illustrations/terminal diagrams belonging to the text, with explanations.

If the questions in the left-hand column can be answered conclusively with "yes", continue trouble-shooting with the next box down.

If the answer to the question is "no", branch to the center column and carry out the tests in the order given there.

After rectifying a fault repeat the test as a check.

REQUIREMENTS FOR TESTING:

- Battery fully charged
- Engine in good mechanical condition (e.g. compression, valve clearance etc.)
- Engine at operating temperature, approx. +80°C (where necessary)
- Proper seating of all plug connections of wiring harness

TROUBLE-SHOOTING CHART

Customer complaint (symptoms of trouble)

1. Starting motor operates, engine fails to start or starts only with difficulty
2. Engine starts but then dies
3. Idle problems (engine speed, exhaust)
4. Poor throttle response
5. Engine missing (ignition, mixture preparation)
6. Insufficient maximum power/speed
7. Excessive fuel consumption
8. Engine diesels
9. Engine pings/knocks
10. Engine overheats
11. Fault lamp

Cause (component fault)											Coord.	
*	*	*	*	*	*	*	*	*	*	*	Evaluate self-diagnostics	B 5
									*		Fault lamp defective	C 21
*			*	*							Engine-speed/reference-mark sensor	C 23
*											Test primary side	C 23
*		*	*	*	*	*					Test secondary side	C 25
								*	*		Poor fuel quality	—
*			*	*	*						Fuel pressure	D 1
	*			*	*						Fuel filter	D 1
*	*	*	*	*	*	*					Choke-valve plate	D 3
*	*			*	*						Float/needle valve	D 5
*	*	*	*	*	*						Dirt in carburetor	D 7
	*	*	*	*	*						Induction system not sealed	D 9
	*	*									Intake-manifold heating	D 15
	*	*									Intake-air preheating	D 11
				*							Generator, interference suppression	—
		*	*								Bypass heating	D 13

B03

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TROUBLE-SHOOTING CHART (continued)

Customer complaint (symptoms of trouble)

1. Starting motor operates, engine fails to start or starts only with difficulty
2. Engine starts but then dies
3. Idle problems (engine speed, exhaust)
4. Poor throttle response
5. Engine missing (ignition, mixture preparation)
6. Insufficient maximum power/speed
7. Excessive fuel consumption
8. Engine diesels
9. Engine pings/knocks
10. Engine overheats
11. Fault lamp

											Cause (component fault)	Coord.
	*					*					Adjustment, throttle valve Stage I	D 17
	*	*	*	*	*						Incorrect nossle installa- tion	D 25
		*		*							Vacuum unit stage II	D 21
	*	*		*							Setting of throttle valve stage II	D 19
	*	*									Exhaust-gas recirculation	D 27
		*		*	*						Adjustment of accelerator actuation	D 21
	*										Idle-CO adjustment	E 1
	*	*									Throttle plate worn	D 17
						*	*				Check octane-number adaptation	C 27
		*									Released and forced return	D 23

B04

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USE OF SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE, AND SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM

The control unit installed in this vehicle incorporates self-diagnosis. For this reason, trouble-shooting must start with self-diagnosis.

Activation of self-diagnosis is described starting on Co-ordinate B07.

The self-diagnosis test table starting on B09 includes:

- Fault indication (flashing code)
- Components or system functions inspected
- Test instructions/conditions
- Connection terminals
- Set-value information
- Co-ordinate information for trouble-shooting and elimination in the subsequent self-diagnosis trouble-shooting program.

USING THE SELF-DIAGNOSIS, SELF-DIAGNOSIS TEST TABLE AND SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (Continued)

The self-diagnosis trouble-shooting program is divided into three columns starting at Coordinate B13.

The left-hand column contains test instructions and set values.

The center column contains information on trouble-shooting and on how to rectify the fault.

The right-hand column contains the illustrations/terminal diagrams belonging to the text, together with explanations.

If the questions in the left-hand column can be answered conclusively with "yes", continue trouble-shooting with the next box down.

If the answer to the question is "no", branch to the center column and carry out the tests in the order given there.

After rectifying a fault, repeat the test as a check.

If the self-diagnosis indicates a fault, but no system fault or component fault was found during trouble-shooting, try replacing the control unit.

If no more fault is indicated in self-diagnosis and the customer complaint has still not been eliminated (symptom of trouble), continue trouble-shooting with the trouble-shooting chart starting at Coordinate B03.

SELF-DIAGNOSIS

Fault lamp (engine indicator light)

Fault lamp in dashboard lights up after the ignition is turned on.

- Start engine:
1. Fault lamp goes out shortly after the engine is running and if no fault is present at the time.
 2. Fault lamp does not go out or it continually or periodically lights up during travel: evaluate flashing code.

Note: Faults which occur only briefly and lead to the periodic illumination of the fault lamp are stored in memory as well.

ACTIVATION OF SELF-DIAGNOSIS:

Switch on ignition or let engine run.

Disconnect the diagnostic's protective plug. Connect sockets A (ground) and B (stimulus lead to control-unit term. 31) of the diagnostic plug (upper illustration) with lead.

Fault lamp in the dashboard will begin to flash.

To output flashing codes 6 2 and 6 3, the engine must be kept at idle during diagnostic output.

Assess flashing code (lower illustration).

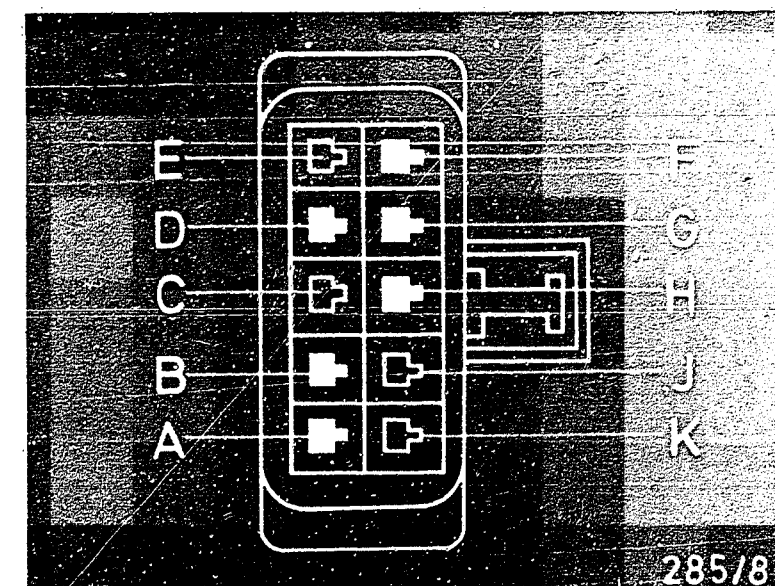
The code for any fault consists of two flashing-pulse blocks. Each block represents a number and contains 1 to 9 pulses. One pulse corresponds to the number 1, 9 pulses correspond to 9. For each pulse the fault lamp illuminates briefly.

There is a longer pause between the blocks than between the individual pulses. Between two fault codes is an even longer pause (approx. 3 seconds).

Each diagnostic output begins with the same starting code, 1 2.

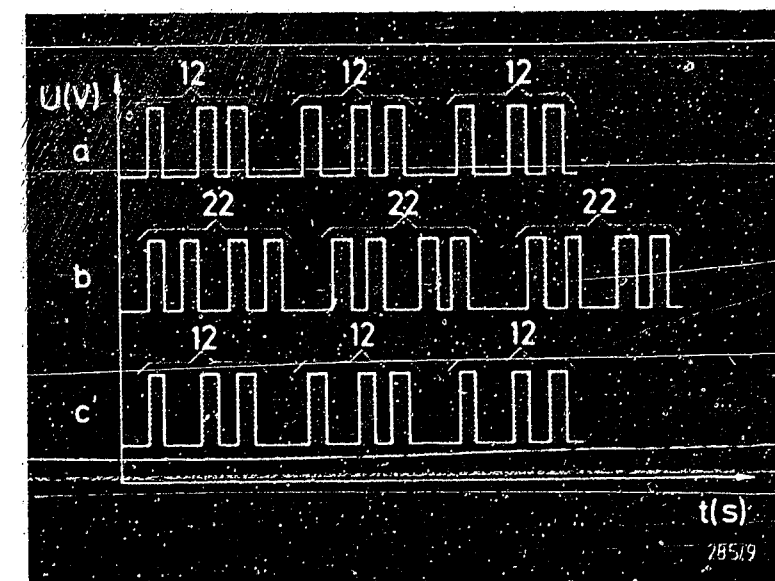
This flashing code is repeated at least 3 times. It indicates that the diagnostic output is functioning. If there are no faults stored in the fault memory, the flashing code 1 2 is continuously repeated. If there is a fault stored in the control unit, after the flashing code 1 2 the first fault is output 3 times. If there is another fault stored, its flashing code is likewise shown 3 times.

The fault memory is erased by disconnecting the battery for about 1 minute, or occurs at least 20 engine starts after elimination of the pertinent faults.



Plug assignment, diagnostic plug

- a = Flash code 12 indicates diagnostic mode
- b = Fault code output 22
- c = Fault output completed



SELF-DIAGNOSIS TEST TABLE

Fault display Flashing code	Test of components/function	Test instructions/conditions	Term- inals	Set values	Coord.
1 2	Control-unit diagnosis output	Control unit indicates that it is in the diagnostic mode	30	—	—
1 4	Temperature sensor, coolant (short circuit to ground)	Resistance of temperature sensor: at 20°C at 80°C	13 23 13 23	see brief instruc. see brief instruc.	B 13
1 5	Temperature sensor, coolant (open circuit)				
2 2	Throttle-valve potentiometer (short circuit to ground or open circuit)	Resistance of throttle-valve and throttle-valve positioner potentiometers in parallel: Wiper resistance of throttle-valve potentiometer: Operate engine at idle. Seal ventilating side of throttle-valve positioner. Switch off engine. Switch on ignition. Accelerator pedal in idle position: Accelerator pedal in full-load position: Resistance continually changes between min. and max.	9 6 9 7 9 7	see brief instruct. see brief instruc. see brief instruc.	B 15
4 1	Temperature sensor, in- take manifold (short circuit to ground)	Resistance of temperature sensor: at 20°C at 80°C	22 23 22 23	see brief instruc. see brief instruc.	
4 3	Temperature sensor, in- take manifold (open circuit)				
4 8	Supply voltage too low		4 5 + -	greater than 10V	B 21
4 9	Supply voltage too high	Check generator/regulator	4 5 + -	less than 15V	—
5 1	Control unit defective	After all faults have been read out erase the fault memory. Let engine run briefly. Repeat self-diagnosis output. If there is again fault display, replace control unit.	—	—	—

SELF-DIAGNOSIS TEST TABLE (Continued)

Fault display Flashing code	Test of components/functions	Test instructions/conditions	Term- inals	Set values	Coord.
5 3	Potentiometer in throttle-valve positioner (open circuit)	Resistance of throttle-valve and throttle-valve positioner potentiometers in parallel.	9 6	see brief instruc.	B 23
5 4	Potentiometer in throttle-valve positioner (short circuit to ground)	Wiper resistance, potentiometer in throttle-valve positioner: (Trigger evacuating valve in throttle-valve positioner during testing and pull back throttle-valve positioner with hand vacuum pump). Resistance continually drops.	28 6 28 6	see brief instruc. see brief instruc.	
5 6	Choke-valve actuator current excessive	Insulation resistance of choke-valve actuator:	14 5	greater than 1 M Ω	C 1
5 7	Choke-valve actuator current insufficient	Winding resistance of choke-valve actuator:	14 15	see brief instruc.	
5 8	Input for CO adjustment (short circuit to ground)	Insulation resistance, CO adjustment input: (Adjustment plug pulled)	10 5	greater than 1 M Ω	C 5
5 9	Throttle-valve positioner extends too slowly	Fault indicated only if engine idling during diagnostic output.			C 7
6 1	Throttle-valve positioner retracts too slowly	Switch off engine and check extension or retraction time of throttle-valve positioner: Retraction time: Extension time:	— —	see brief instruc. see brief instruc.	
6 2	Ventilating valve in throttle-valve positioner:	Insulation resistance of ventilating valve: Winding resistance of ventilating valve:	34 5 34 35	greater than 1 M Ω see brief instruc.	C 09
6 3	Evacuating valve in throttle-valve positioner	Insulation resistance of evacuating valve: Winding resistance of evacuating valve: :	33 5 33 35	greater than 1 M Ω see brief instruc.	C 15

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (1)

SELF-DIAGNOSIS FLASHING CODE ■

Test coolant-temperature sensor
(engine):

Disconnect plug from temperature
sensor.

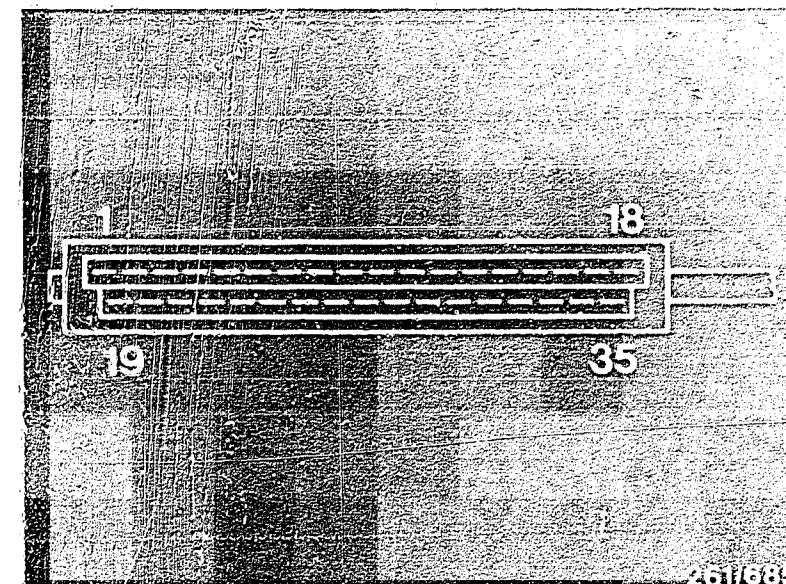
Test resistance directly at plug
pins of temperature sensor:

Set value:
see brief instructions

Is set value reached?

N>

Replace coolant-temperature
sensor (lower illustration, arrow)



Test plug for coolant-
temperature sensor
(center illustration):

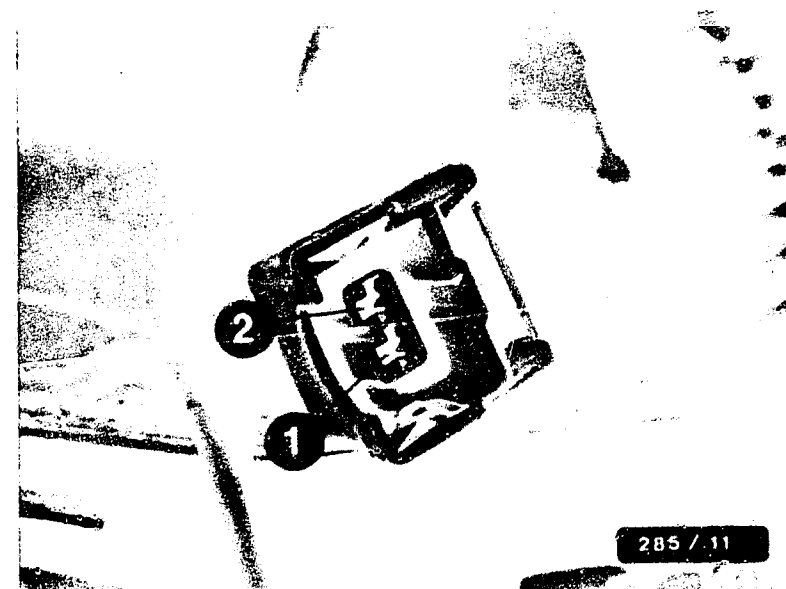
Visual check:

Has cable fallen out or
is there corrosion?

Is plug OK?

N>

Eliminate contact
resistances in coolant-
temperature sensor plug.
If necessary replace plug.



Connect voltmeter to temp-
erature-sensor plug
(center illustration) and test
term. 1 to 2:

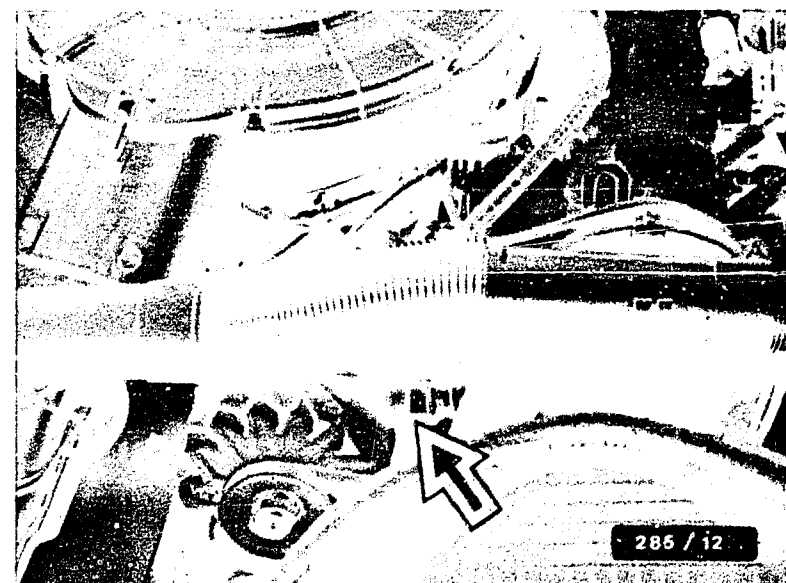
Set value:
see brief instructions

Is set value reached?

N>

Disconnect control-unit plug
(upper illustration).
Using ohmmeter, test leads
from control-unit plug term.
13 and term. 23 to coolant-
temperature sensor plug (term. 1
and term. 2, center illustration)
for short and open circuits.

Eliminate contact resistances,
open circuits, and short
circuits from leads.



Back to self-diagnosis
test table B09

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (2)

SELF-DIAGNOSIS FLASH CODE 2 2

Test throttle-valve potentiometer:

Let engine idle. Seal ventilating side of throttle-valve positioner (lower illustration, arrow). Switch off engine.

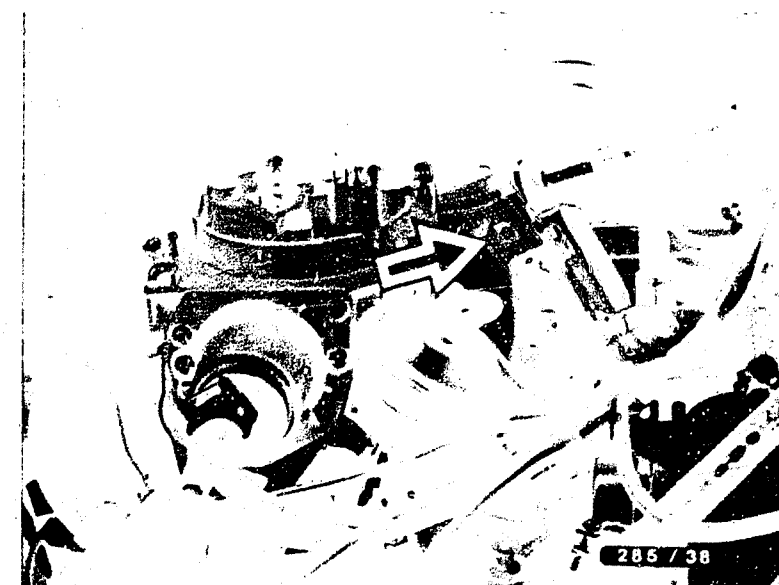
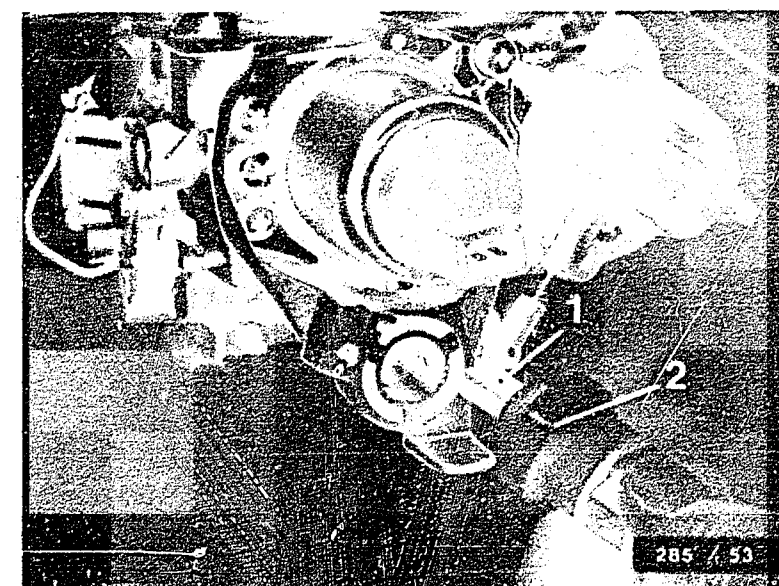
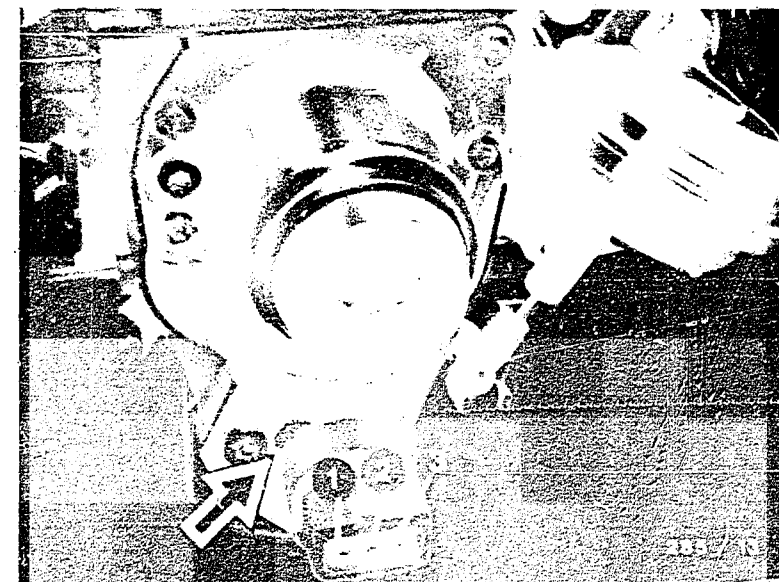
Disconnect plug from throttle-valve potentiometer. Using ohmmeter, measure directly at plug pins of the throttle-valve potentiometer (upper illustration), term. 1 to term. 3.

Set value:
See brief instructions.
Is value within the indicated tolerance?

N>

Replacing throttle-valve potentiometer:

Unscrew fastening screw of throttle-valve potentiometer and remove retaining bracket. When removing the potentiometer, be careful that the coupling does not fall out. When inserting, make sure of proper seating of the coupling (center illustration, 1) and the detent slot (upper illustration, arrow, center illustration 2).



Continued on next picture page

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (2) CONTINUED (1)

SELF-DIAGNOSIS FLASH CODE 2 2 "

Test wiper resistance of throttle-valve potentiometer:

Connect ohmmeter directly to the plug pins of the throttle-valve potentiometer (upper illustration) term. 1 and term. 2.

Slowly depress accelerator pedal from idle to full load.

Set value:

See brief instructions.

Resistance increases evenly from min. to max.

Set value within the tolerance indicated?

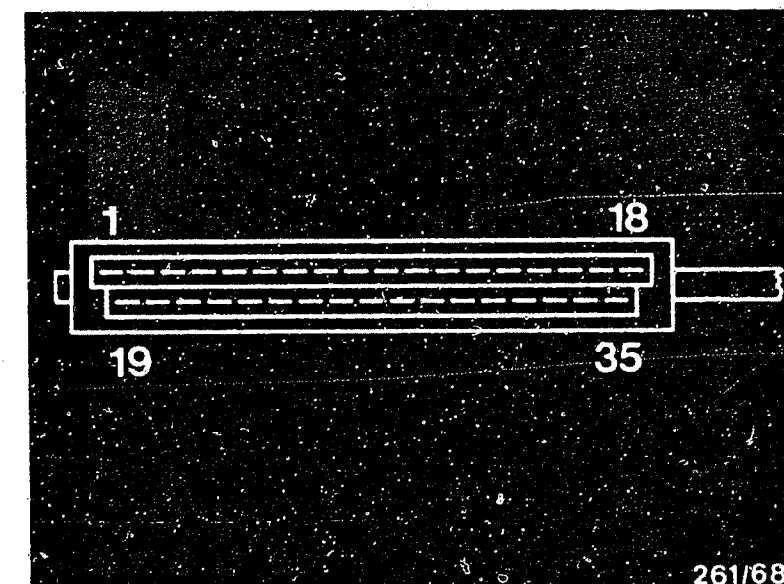
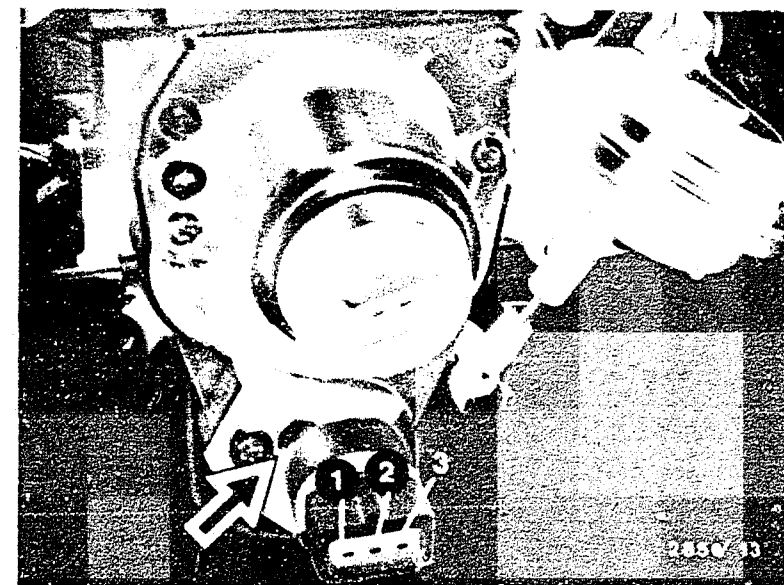
Does resistance change evenly?

N>

Replacing throttle-valve potentiometer:

Unscrew fastening screw of throttle-valve potentiometer and remove retaining bracket.

When removing the potentiometer, be careful that the coupling does not fall out. When inserting, make sure of proper seating of the coupling (center illustration, 1) and the detent slot (upper illustration, arrow, center illustration 2).



Test voltage supply to throttle-valve and throttle-valve positioner potentiometers:

Connect voltmeter to throttle-valve potentiometer plug (lower illustration) terms. 1 and 3. Switch on ignition.

Set value:

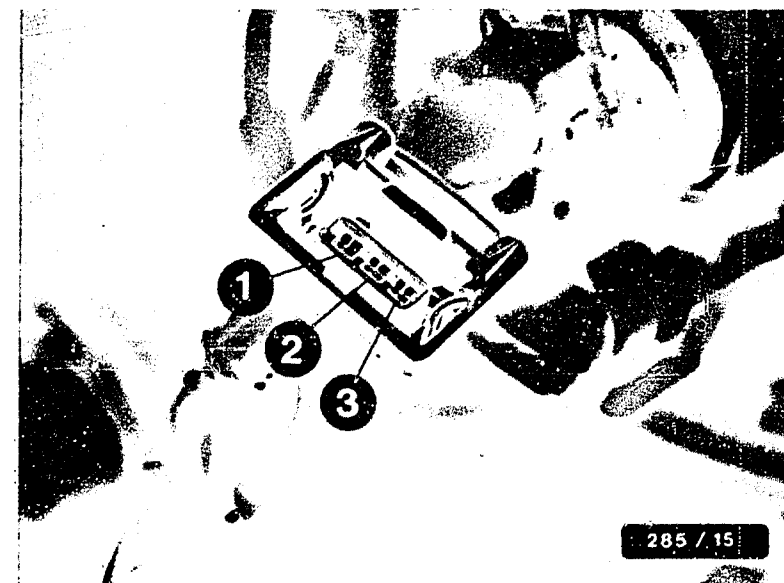
See brief instructions.

Is set value reached?

N>

Remove control-unit plug. Using ohmmeter, test leads from control-unit plug (center illustration) terms. 6, 7, and 9 to the throttle-valve potentiometer plug (lower illustration) terms. 1, 2, and 3 for short and open circuits.

Eliminate short or open circuits in leads.



Back to self-diagnosis test table B09

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (3)

SELF-DIAGNOSIS FLASH CODE 4 1/4 3

Test intake-manifold temperature sensor:

Remove plug from temperature sensor.
Carry out resistance measurement directly at the plug pins of the temperature sensor:

Set value:
See brief instructions.

Is set value reached?

Replace intake-manifold temperature sensor (lower illustration).

Check plug of intake-manifold temperature sensor (center illustration):
Visual check - has cable fallen out or is there corrosion?

Is plug OK?

With voltmeter at temperature-sensor plug, test term. 1 to term. 2:

Set value:
see brief instructions.

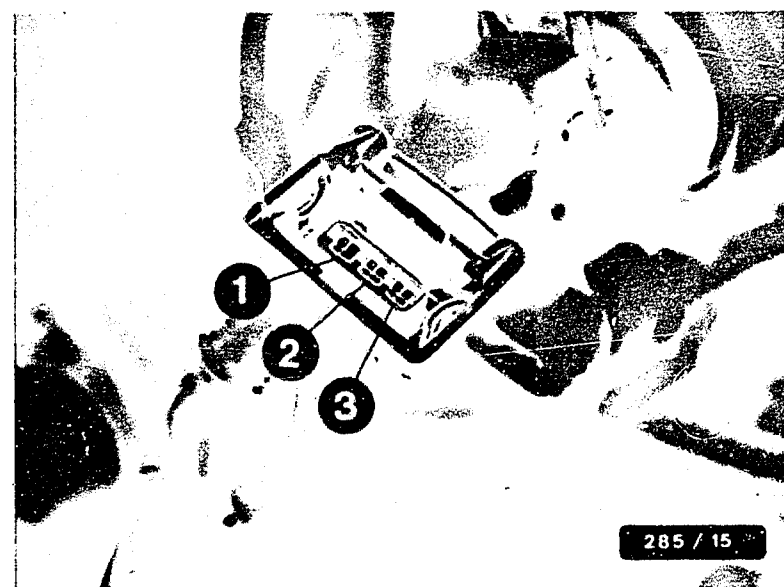
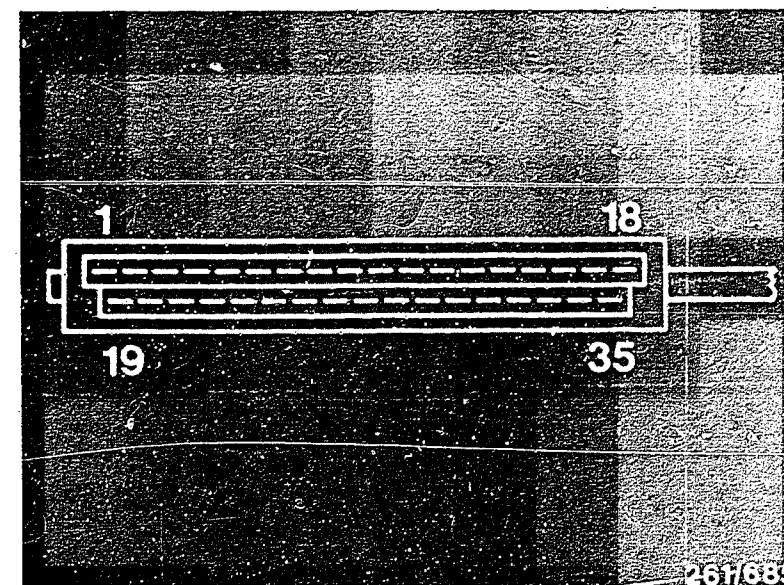
Is set value reached?

Back to self-diagnosis test table B09

Eliminate contact resistances in plug of intake-manifold temperature sensor.
If necessary replace plug.

Disconnect control-unit plug (upper illustration).
Using ohmmeter, test leads from control-unit plug term. 22 and term. 23 to plug of intake-manifold temperature sensor (center illustration) for short and open circuits.

Eliminate contact resistances, open circuits, and short circuits in leads.



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (4)

V

SELF-DIAGNOSIS FLASH CODE 4 8

Test battery terminals and ground connections:

Visual check to determine presence of corrosion or whether ground lead has fallen off. Are battery terminals and ground cables OK?

Y

V

Test supply voltage to control relay:

With voltmeter connected to frame test control relay (lower illustration, green relay frame) term. 86 to ground.

Set value: greater than 10 V.

Is set value reached?

Y

V

Disconnect control-unit plug
With voltmeter connected to control-unit plug, test the following connections:

Term. 11 to term. 5
Term. 20 to term. 5
Term. 35 to term. 5
Term. 18 to term. 5

Set values: greater than 10 V

Are set values reached?

Y

V

Back to self-diagnosis test table B09

N>

Clean battery terminals.
Repair ground connections.

N>

Test control relay:

Carry out visual checks to determine whether there is corrosion or if cable has fallen out. Using ohmmeter, test lead from relay frame term. 86 to central electrics term. 30 for short and open circuits. Eliminate contact resistances, open circuits, and short circuits in lead.

Replace control relay.

N>

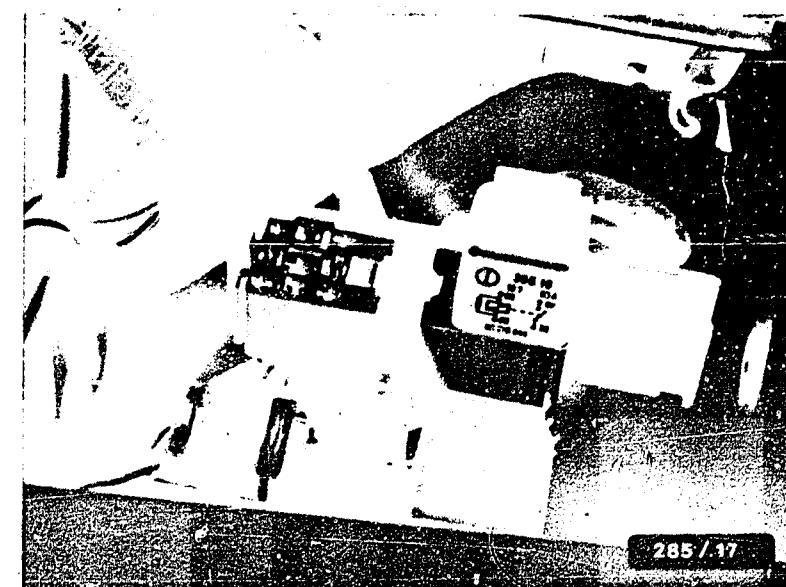
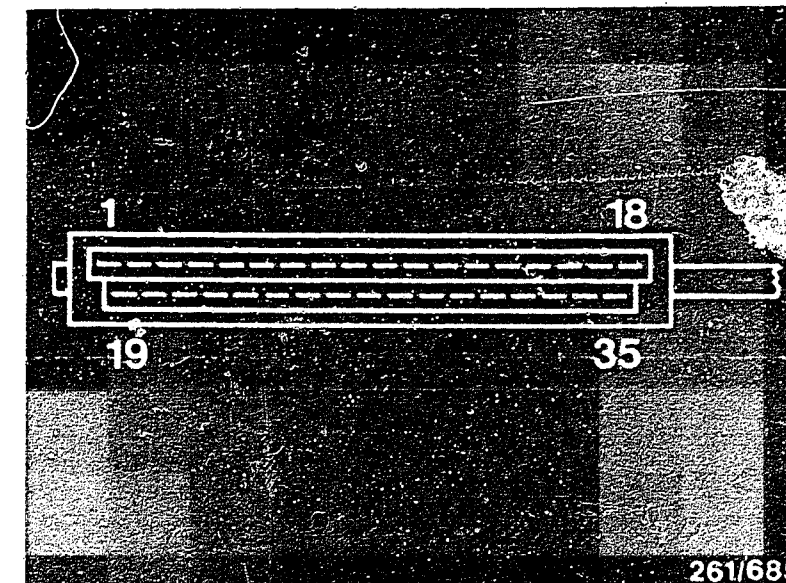
Test fuses terms. 15 and 30.

Using ohmmeter, test leads from control-unit plug (upper illustration):

* Term. 4 to ignition lock term. 15
* Term. 20 to control relay term 85.
* Terms. 5, 16, 17, and 19 to ground

test for short and open circuits.

Eliminate short circuits or contact resistance in leads.



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (5)

V

SELF-DIAGNOSIS FLASH CODE 5 3/5 4

N>

Testing potentiometer in throttle-valve positioner:

Switch off ignition and wait 20 sec.

Remove plug from throttle-valve positioner.

With ohmmeter connected directly to the plug pins of the throttle-valve positioner (upper illustration) test term. 3 to 4:

Set value:

See brief instructions.

Is set value reached?

V

Replacing throttle-valve positioner:

Disconnect all plugs from carburetor.

Remove carburetor.

Loosen fastening nuts (3) and remove throttle-valve positioner.

Install new throttle-valve positioner and re-mount carburetor. Plug all plugs onto carburetor.

Testing adjustment of throttle-valve section stage I

Switch of ignition.

Connect plug connection for CO adjustment.

Connect vacuum pump to evacuating valve and during adjustment generate a continuous pressure differential (approx. 250 mbar)(tappet of throttle-valve positioner goes to equilibrium position).

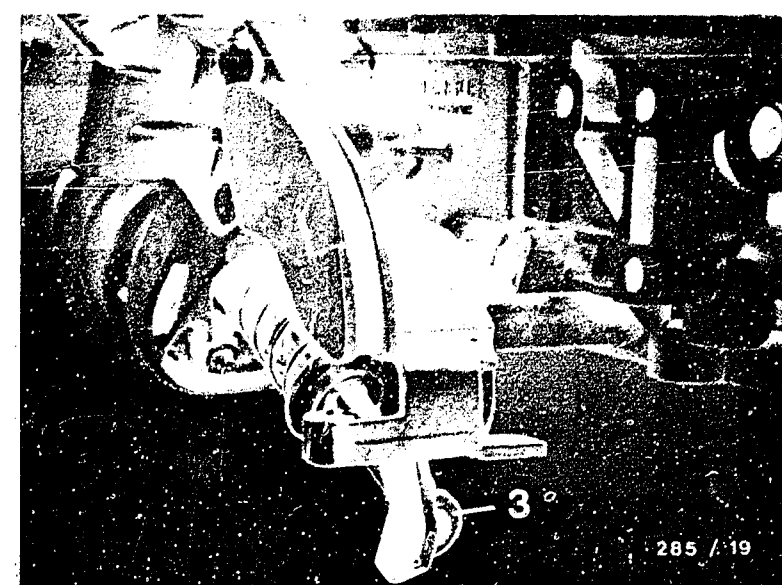
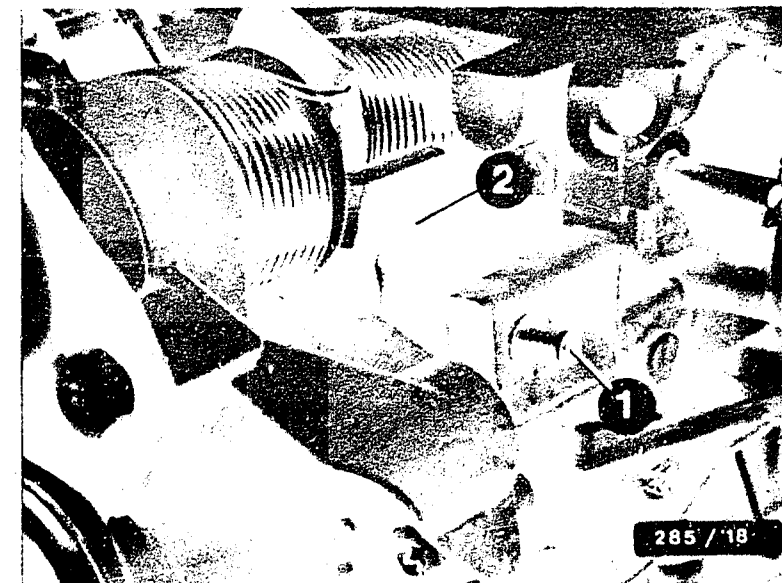
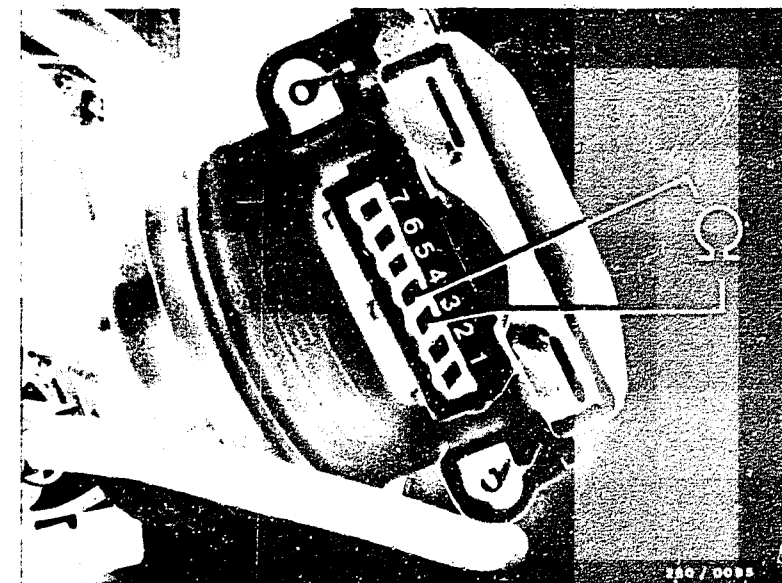
In this position, the feeler gauge (3.15 - 0.05 mm) must slide smoothly between the throttle-valve stop screw (center illustration 1 and the stop 2).

Adjust with new idle stop screw (lower illustration, 3) shear-head screw).

After adjustment break off shear-head screw.

Disconnect plug connection to CO adjustment.

Restore hose connections.



Continued on next picture page

SELF-DIAGNOSIS FLASH CODE 5 3/54

Test wiper resistance of potentiometer in throttle-valve positioner:

Connect ohmmeter directly to plug pins of throttle-valve positioner terms. 3 and 5.

Connect hand vacuum pump on evacuation side.

Apply 12 V to evacuating solenoid-operated valve (term. 2 +, 1 -, upper illustration).

During testing pull back the throttle-valve positioner with the hand vacuum pump.

Set value:

See brief instructions (Reading must change evenly between min. and max.).

(Check lead from control-unit plug to plug of throttle-valve positioner for short and open circuits.)

Is set value reached?
Does reading change evenly?

N>

Replacing throttle-valve positioner:

Disconnect all plugs from carburetor.

Remove carburetor.

Loosen fastening nuts (3) and remove throttle-valve positioner.

Install new throttle-valve positioner and re-mount carburetor. Plug all plugs onto carburetor.

Testing adjustment of throttle-valve section stage I

Switch of ignition.

Connect plug connection for CO adjustment.

Connect vacuum pump to evacuating valve and during adjustment generate a continuous pressure differential (approx. 250 mbar)(tappet of throttle-valve positioner goes to equilibrium position).

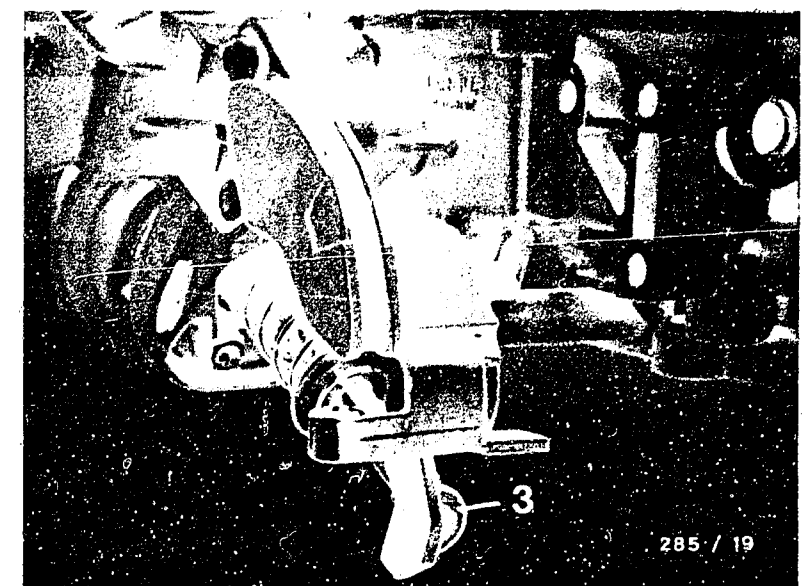
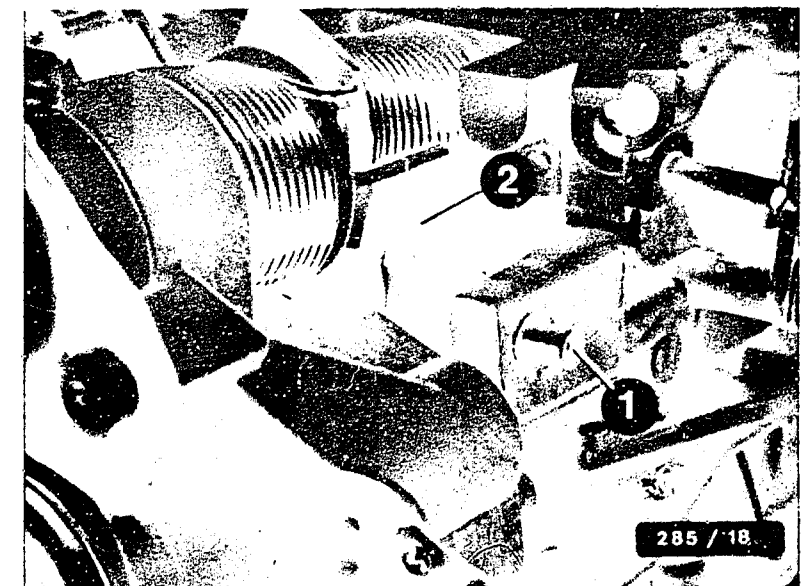
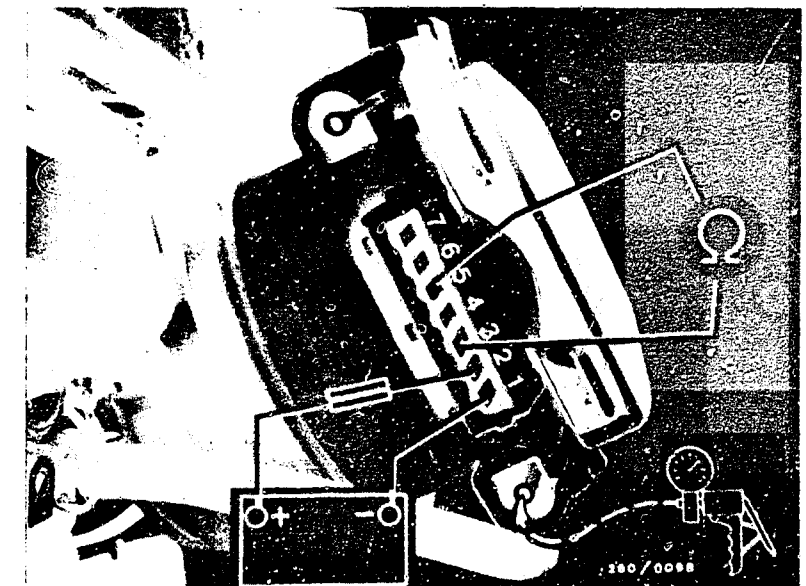
In this position, the feeler gauge (3.15 - 0.05 mm) must slide smoothly between the throttle-valve stop screw (center illustration 1 and the stop 2).

Adjust with new idle stop screw (lower illustration, 3) shear-head screw).

After adjustment break off shear-head screw.

Disconnect plug connection to CO adjustment.

Restore hose connections.



Continued on next picture page

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (5) CONTINUED (2)

SELF-DIAGNOSIS FLASH CODE 5 3/5 4
(continued)

Test voltage supply to throttle-
valve and throttle-valve
positioner potentiometers

Connect voltmeter to plug
of throttle-valve positioner
(lower illustration) terms.
3 and 4. Switch on
ignition.

Set value:
See brief instructions.

Is set value reached?

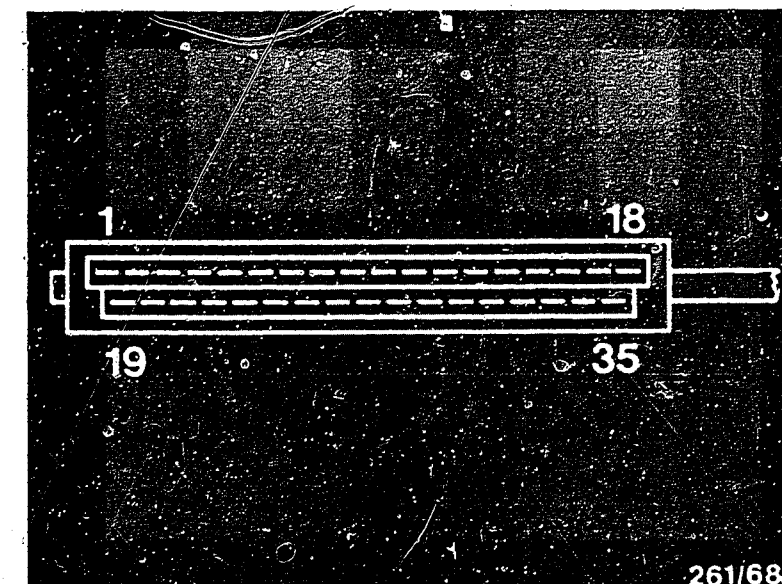
N>

Switch off ignition (wait 20
sec.) or disconnect control
relay.

Disconnect control-unit
plug (upper illustration).

Using an ohmmeter, test
leads from control-unit plug
terms. 6 and 9 to plug of
throttle-valve positioner
(lower illustration), terms.
3 and 4 for short and open
circuits.

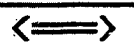
Eliminate short or open
circuits in leads.



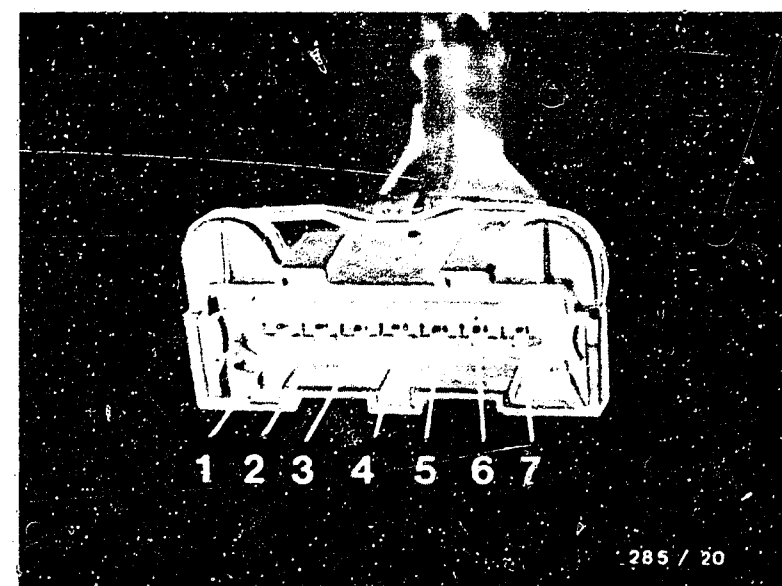
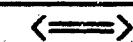
261/685

Back to self-diagnosis
test table B09

B27



B28



285 / 20

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (6)

SELF-DIAGNOSIS FLASH CODE 5 6/5 7

Test insulation resistance of
choke-valve actuator

Remove plug from choke-valve
actuator.

Using ohmmeter, test both
plug pins to ground.

Set value: greater than
1 Ω

Is set value reached?

N>

Replace choke-valve actuator:

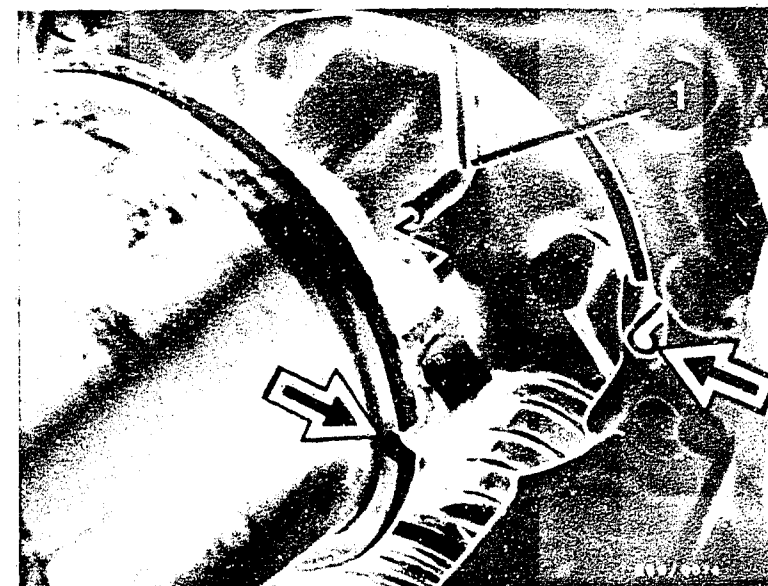
Remove air filter.

Loosen fastening screw (1)
(lower illustration).

Twist the clamping ring (2)
out of mounting.

Remove choke-valve actuator.

When installing new choke-
valve actuator, note detent
(upper illustration, arrows)
as well as the connecting rod (1)
to the choke-valve plate.



Test winding resistance of
choke-valve actuator:

Connect ohmmeter directly to
plug pins of choke-valve
actuator.

Set value:
See brief instructions.

Is set value reached?

N>

Replace choke-valve actuator:

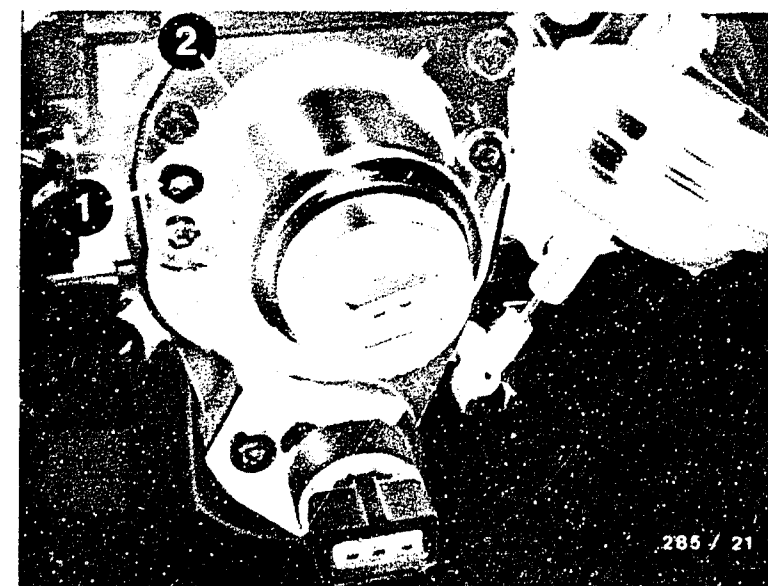
Remove air filter.

Loosen fastening screw (1)
(lower illustration).

Twist the clamping ring (2)
out of mounting.

Remove choke-valve actuator.

When installing new choke-
valve actuator, note detent
(upper illustration, arrows)
as well as the connecting rod (1)
to the choke-valve plate.



Continued on next picture page

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (6) CONTINUED ()

SELF-DIAGNOSIS FLASH CODE 5 6/5 7
(continued)

Test choke-valve actuator
signal:

Connect special input of
motortester between
choke-valve actuator
and wiring harness using
connection cable 1 684 563 093.
Let engine idle.

Set value:
See upper illustration.

Is set value reached?

N>

Switch off ignition (wait
20 sec. or disconnect
control relay).
Disconnect control-unit plug.

Using ohmmeter, test leads
from control-unit plug terms.
14 and 15 to plug of choke-
valve actuator (lower
illustration) for short and
open circuits.

Check plug of choke-valve
actuator for corrosion or
loose contacts (visual check).

Test acceleration enrichment
code:

Briefly actuate accelerator
pedal.

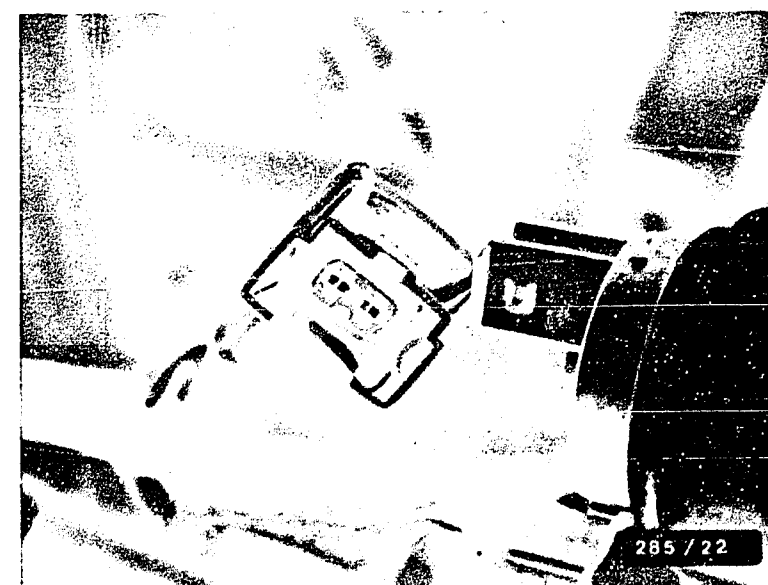
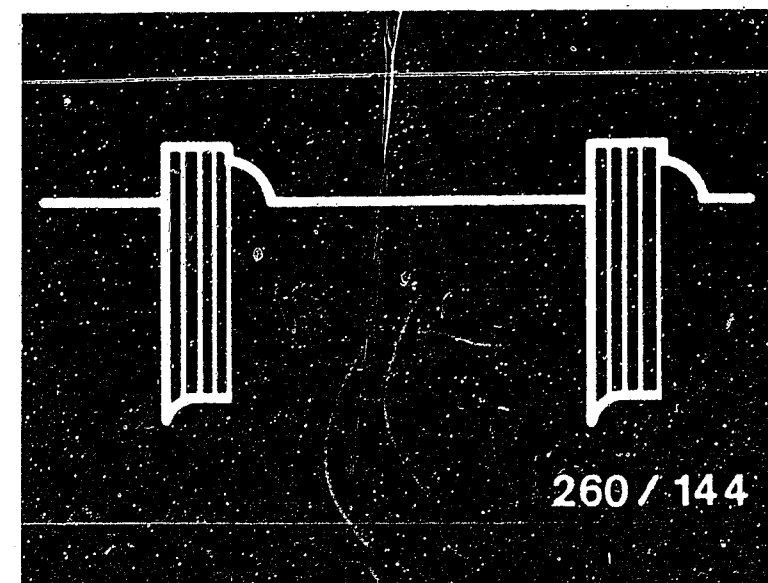
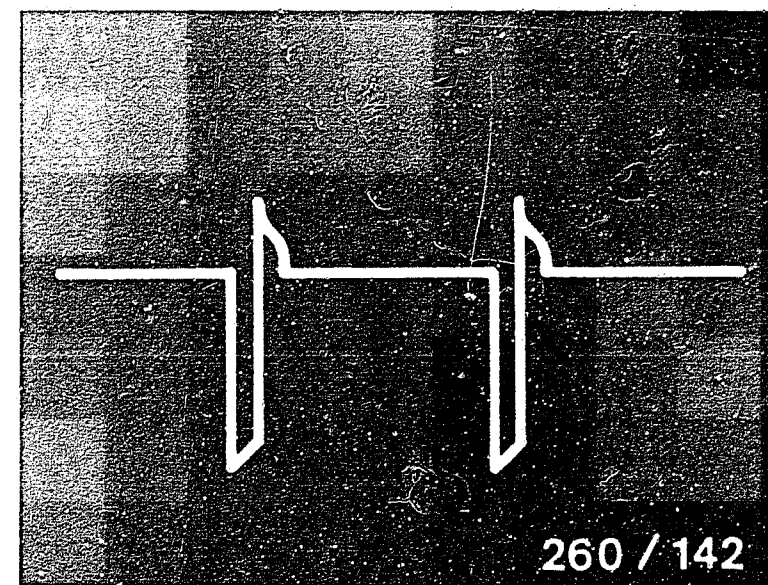
Set value:
See center illustration
(Signal becomes wider).

Is set value reached?

N>

Replace control unit.

Back to self-diagnosis
test table B09



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (7)

SELF-DIAGNOSIS FLASH CODE 5 8

Test CO-adjustment input:

Test whether the push-in plug for CO adjustment (lower illustration, 1) has been pulled off.
Has plug been pulled off?

N> Disconnect push-in plug for CO adjustment.

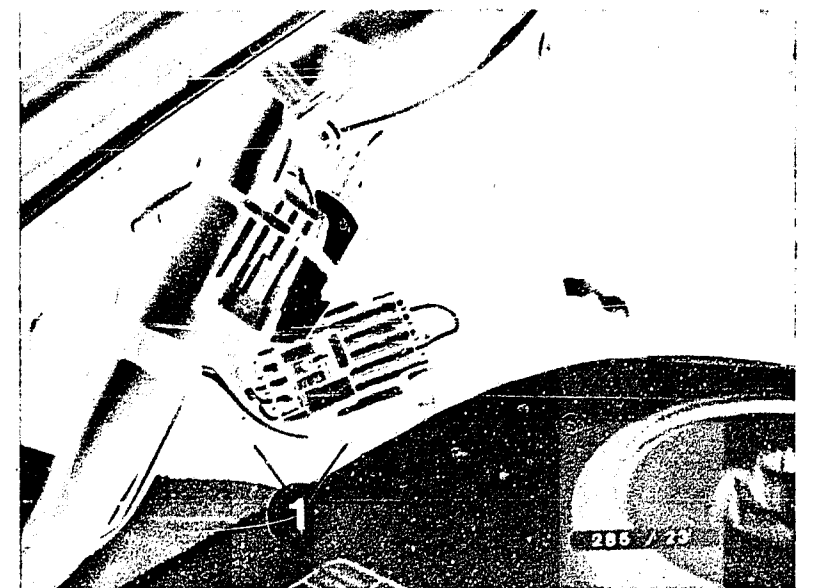
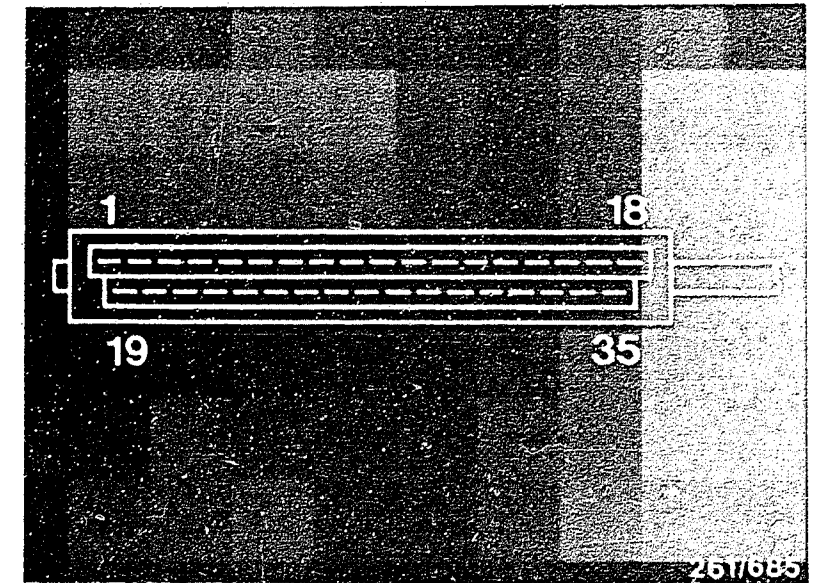
Y
V
Disconnect control-unit plug.

Using ohmmeter, test lead from control-unit plug (upper illustration) term. 10 to the CO-adjustment plug in the engine compartment (lower illustration) for short circuit to ground.

Is lead OK?

N> Eliminate short circuit to ground.
If necessary replace control unit.

Y
V
Back to self-diagnosis test table B09



SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (8)

SELF-DIAGNOSIS FLASH CODE 5 9/6 1

Test operating speed of
throttle-valve positioner:

Let engine idle.

Switch off engine.
Observe throttle-valve position-
er. Throttle-valve positioner
first retracts (overrun
position) and then comes
back out (starting position).

Note the time this takes!
The throttle-valve
positioner must fully retract
or extend within 1 second.

Does the throttle-valve
positioner fully retract
or extend within 1 second?

N>

Throttle-valve positioner
extends too slowly:

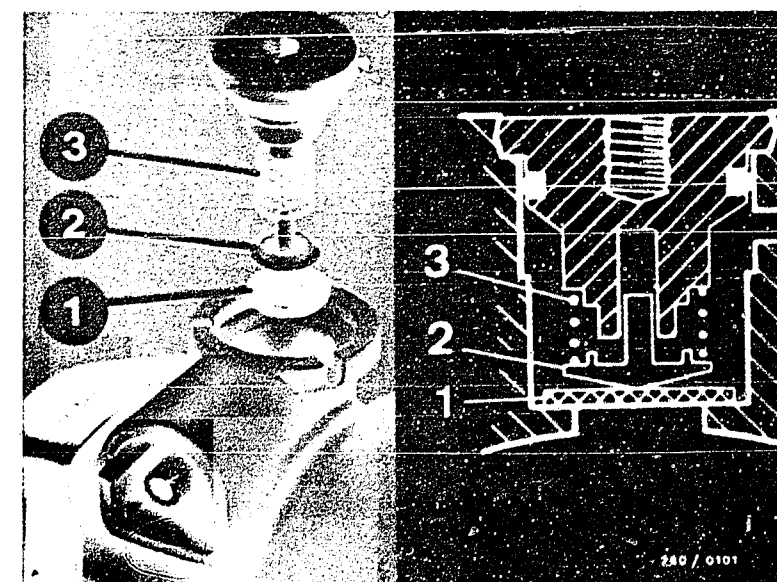
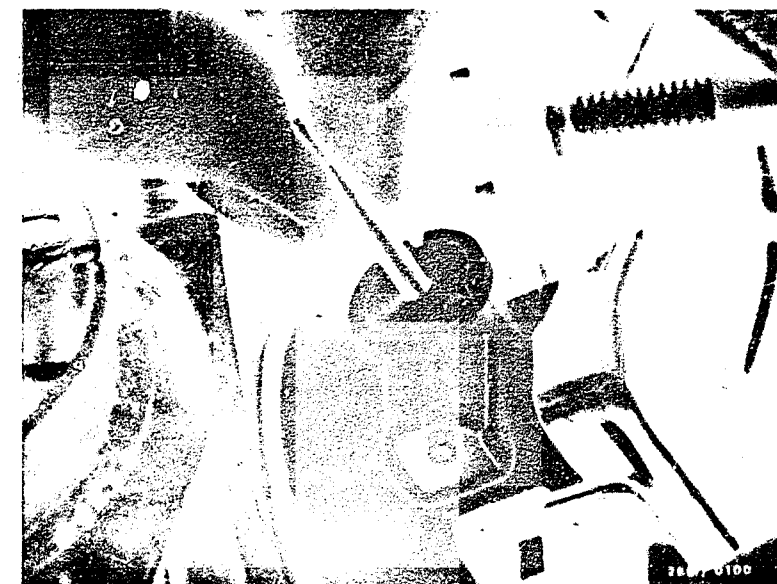
Check hose connection from
throttle-valve positioner
(ventilating side) to air
filter (clean-air side)
for unobstructed passage.

Turn M 4 screw in closing
cover of throttle-valve
positioner (vent. side),
remove cover (upper illustra-
tion).

Take out filter
(lower illustration) and
insert new one with broad
side first (lower illustration).
Press in cover. Restore hose
connections.

Throttle-valve positioner
retracts too slowly:

Check hose connection
from throttle-valve
positioner (evacuating side)
to vacuum connection for
unobstructed passage.



Back to self-diagnosis
test table B09

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (9)

SELF-DIAGNOSIS FLASH CODE 6 2

Test resistance of solenoid-operated valve (ventilating) in throttle-valve positioner:

Switch off ignition. Disconnect plug from throttle-valve positioner.
With ohmmeter connected to the plug pins of the throttle-valve positioner, test term. 6 to term. 7:

Set value:
See brief instructions.

Is set value reached?

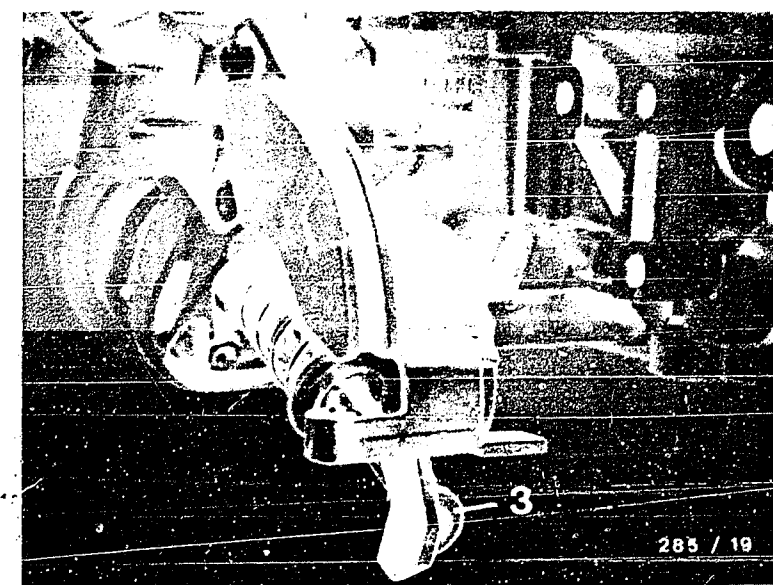
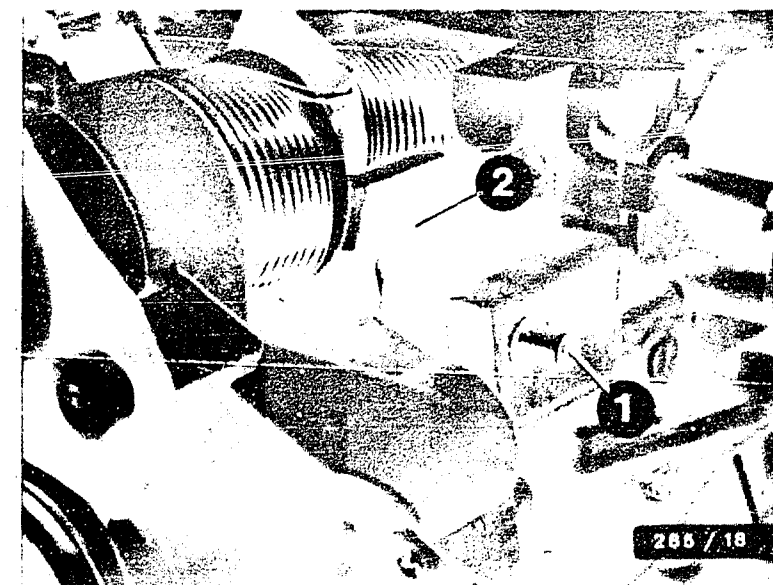
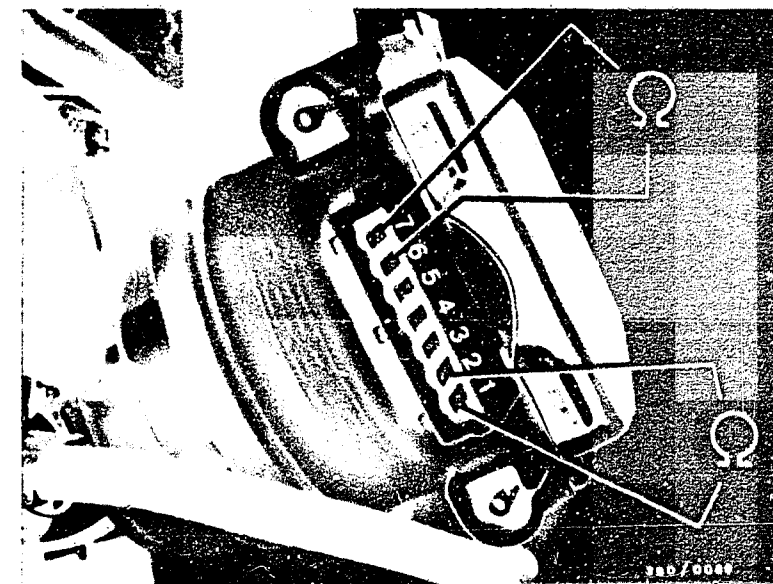
N>

Replacing throttle-valve positioner:

Disconnect all plugs from carburetor.
Remove carburetor.
Loosen fastening nuts (3) and remove throttle-valve positioner.
Install new throttle-valve positioner and re-mount carburetor. Plug all plugs onto carburetor.

Testing adjustment of throttle-valve section stage I

Switch of ignition.
Connect plug connection for CO adjustment.
Connect vacuum pump to evacuating valve and during adjustment generate a continuous pressure differential (approx. 250 mbar)(tappet of throttle-valve positioner goes to equilibrium position).
In this position, the feeler gauge (3.15 - 0.05 mm) must slide smoothly between the throttle-valve stop screw (center illustration 1 and the stop 2).
Adjust with new idle stop screw (lower illustration, 3) shear-head screw).
After adjustment break off shear-head screw.
Disconnect plug connection to CO adjustment.
Restore hose connections.



Continued on next picture page

SELF-DIAGNOSIS FLASH CODE 6 2

Test insulation resistance of solenoid-operated valve (ventilating) in throttle-valve positioner:

With ohmmeter connected directly to plug pins of throttle-valve positioner test terms, 2 and 6 to ground:
Set value: greater than 1 M Ω
Is set value reached?

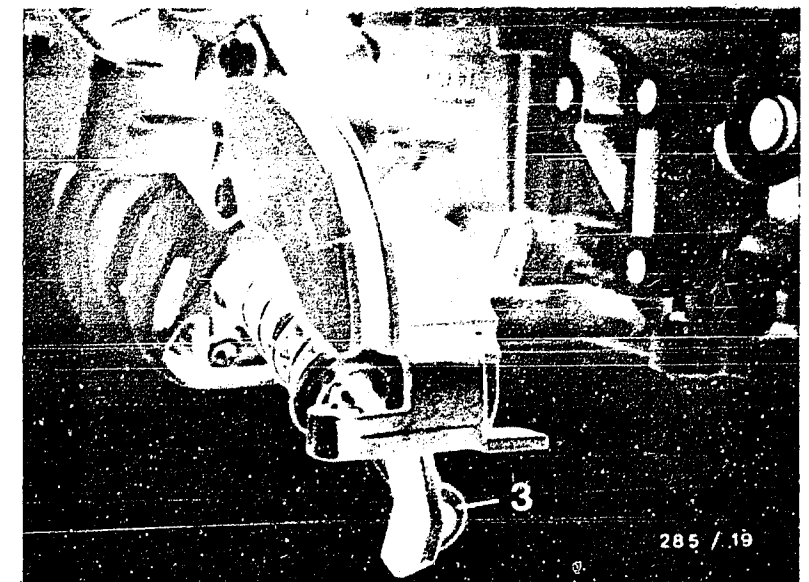
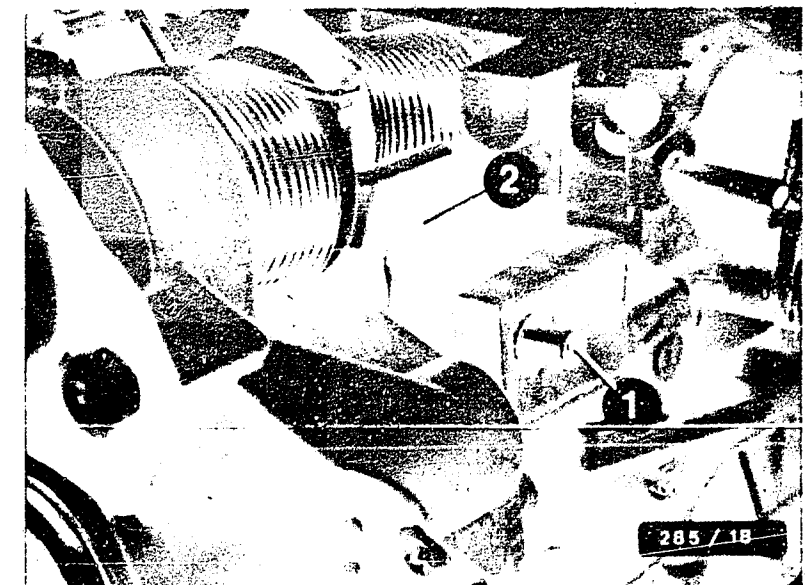
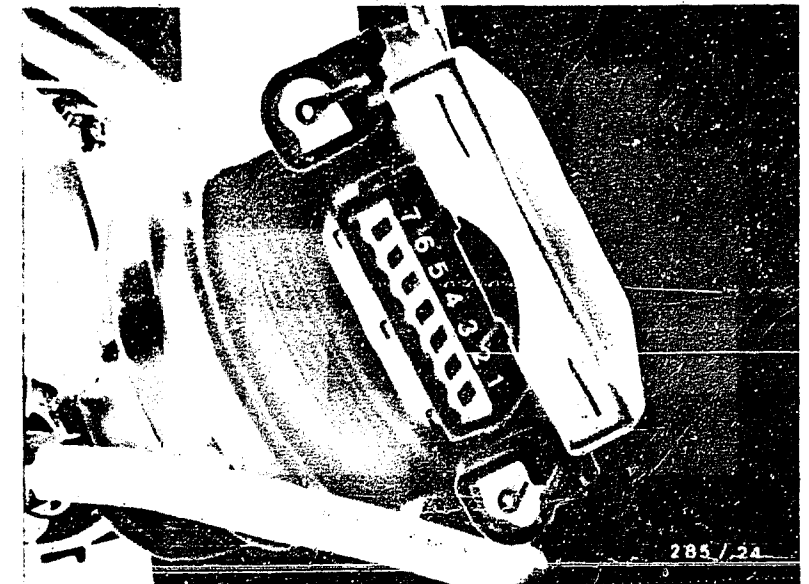
N>

Replacing throttle-valve positioner:

Disconnect all plugs from carburetor.
Remove carburetor.
Loosen fastening nuts (3) and remove throttle-valve positioner.
Install new throttle-valve positioner and re-mount carburetor. Plug all plugs onto carburetor.

Testing adjustment of throttle-valve section stage I

Switch of ignition.
Connect plug connection for CO adjustment.
Connect vacuum pump to evacuating valve and during adjustment generate a continuous pressure differential (approx. 250 mbar) (tappet of throttle-valve positioner goes to equilibrium position).
In this position, the feeler gauge (3.15 - 0.05 mm) must slide smoothly between the throttle-valve stop screw (center illustration 1 and the stop 2).
Adjust with new idle stop screw (lower illustration, 3) shear-head screw).
After adjustment break off shear-head screw.
Disconnect plug connection to CO adjustment.
Restore hose connections.



Continued on next picture page

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (9) CONTINUED ()

SELF-DIAGNOSIS FLASH CODE 6 2
(continued)

Actuation of solenoid-operated
valve (ventilating) in
throttle-valve positioner:

Connect voltmeter to
throttle-valve positioner
plug (center illustration)
terms. 7 and 6.

Switch ignition on and then
off again.

After switching off the
ignition the voltage should
briefly exceed 10 V.

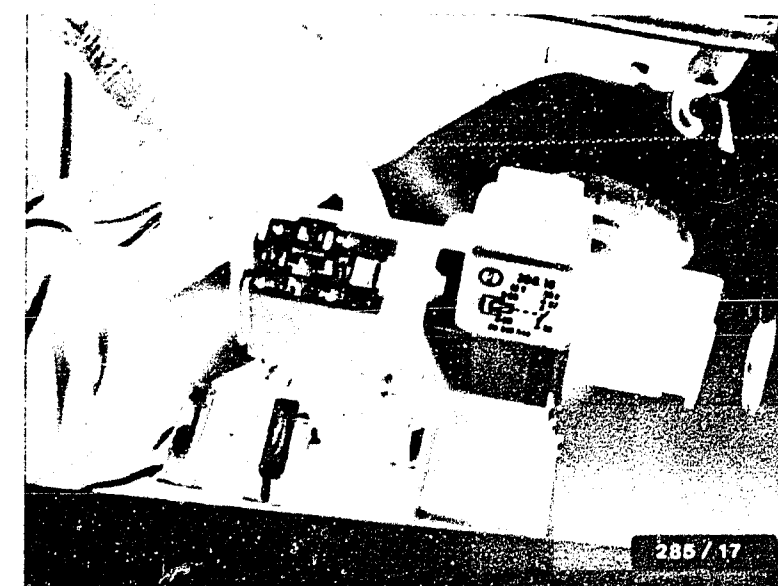
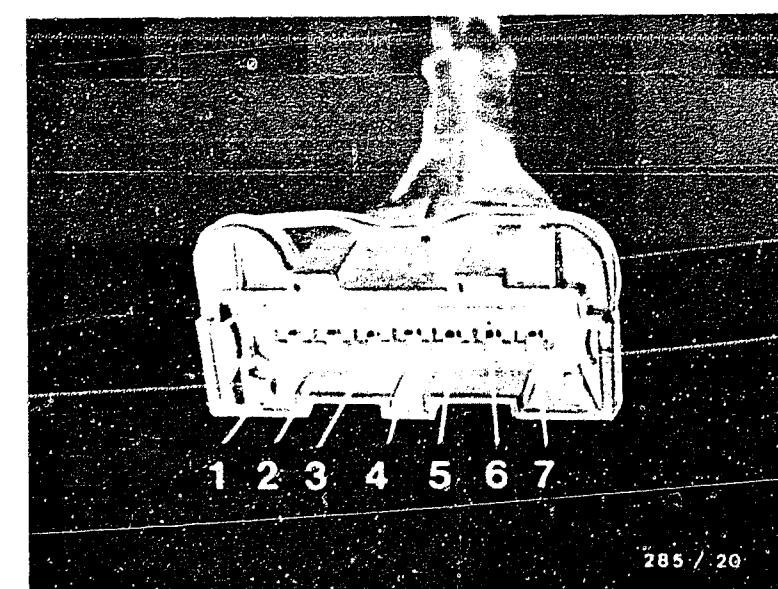
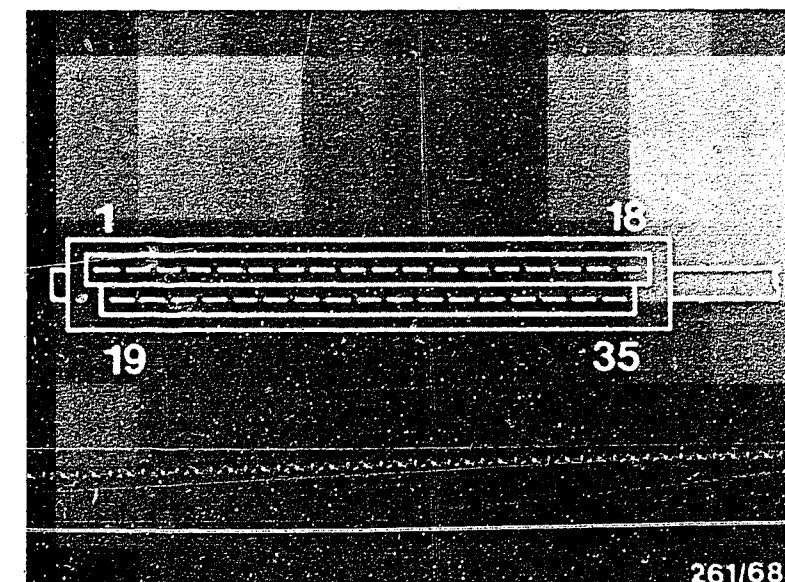
Is this value reached?

N>

Switch off ignition (wait 20
seconds) or disconnect control
relay.

Disconnect control-unit plug
(upper illustration).

Using ohmmeter, test leads
from control-unit plug term.
34 to throttle-valve
positioner (center illustration)
term. 7 and from control
relay (lower illustration,
green relay frame) term. 87
to throttle-valve positioner
plug term. 6 for short and
open circuits.



Back to self-diagnosis
test table B09

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (10)

SELF-DIAGNOSIS FLASH CODE 6 3

Test resistance of solenoid-operated valve (evacuating) in throttle-valve positioner:

Switch off ignition. Disconnect throttle-valve positioner plug.
With ohmmeter connected to the plug pins of the throttle-valve positioner test term. 1 to term. 2:

Set value:
See brief instructions.

Is set value reached?

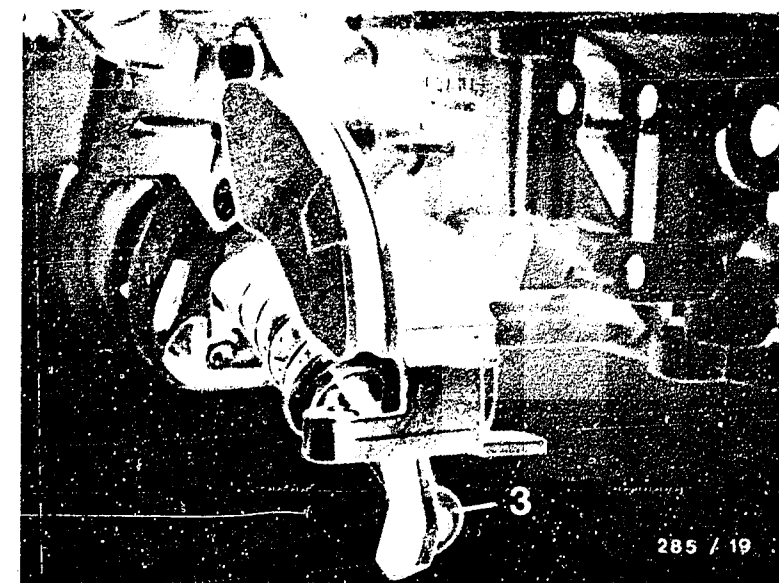
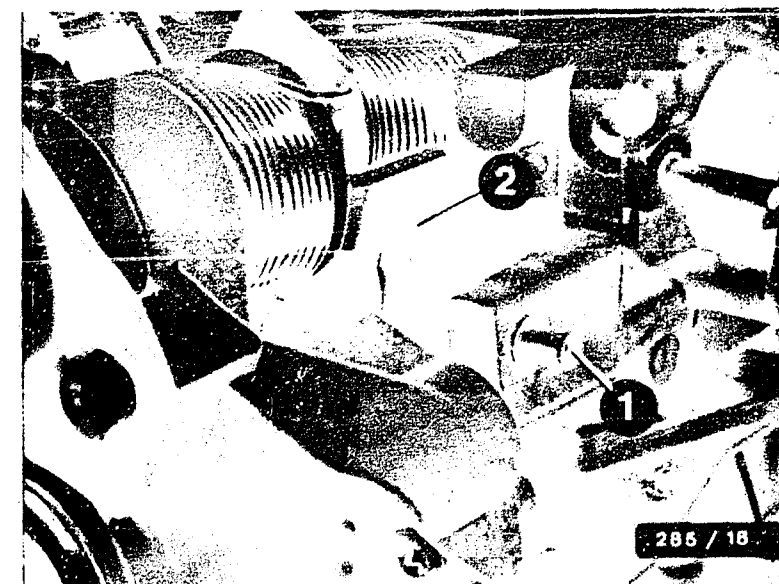
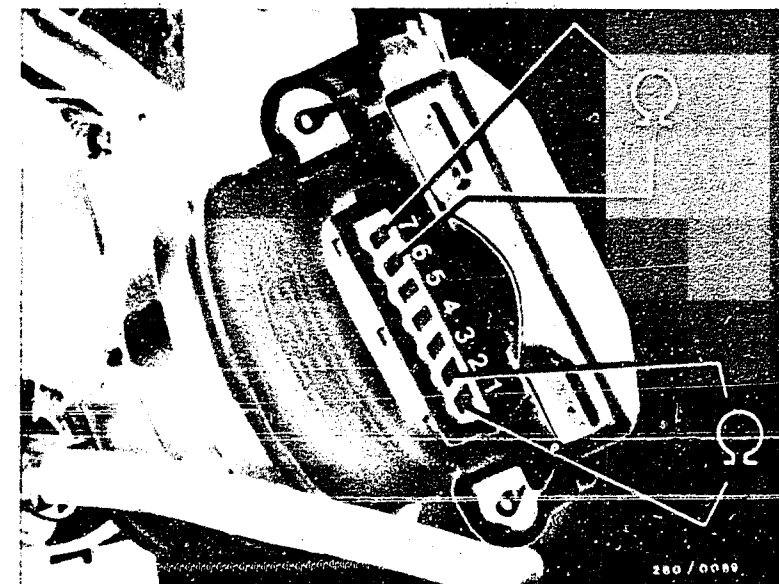
N>

Replacing throttle-valve positioner:

Disconnect all plugs from carburetor.
Remove carburetor.
Loosen fastening nuts (3) and remove throttle-valve positioner.
Install new throttle-valve positioner and re-mount carburetor. Plug all plugs onto carburetor.

Testing adjustment of throttle-valve section stage I

Switch of ignition.
Connect plug connection for CO adjustment.
Connect vacuum pump to evacuating valve and during adjustment generate a continuous pressure differential (approx. 250 mbar)(tappet of throttle-valve positioner goes to equilibrium position).
In this position, the feeler gauge (3.15 - 0.05 mm) must slide smoothly between the throttle-valve stop screw (center illustration 1 and the stop 2).
Adjust with new idle stop screw (lower illustration, 3) shear-head screw).
After adjustment break off shear-head screw.
Disconnect plug connection to CO adjustment.
Restore hose connections.



Continued on next picture page

SELF-DIAGNOSIS FLASH CODE 6 3

Test insulation resistance of solenoid-operated valve (evacuating) in throttle-valve positioner:

Using ohmmeter connected directly to the plug pins of the throttle-valve positioner, test term. 2 to ground:
Set value: greater than 1 M Ω
Is set value reached?

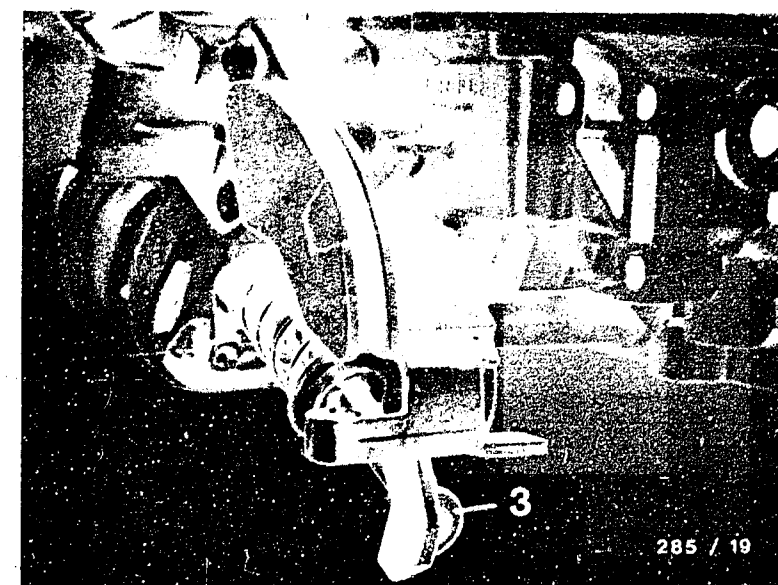
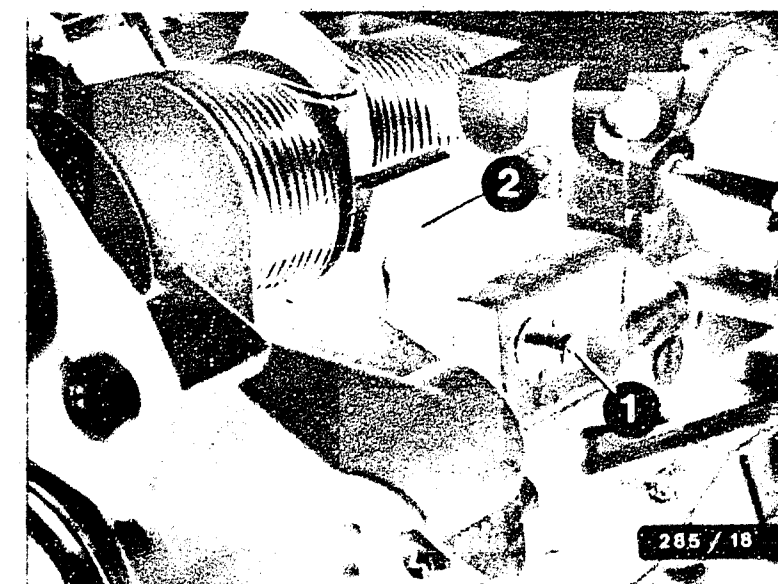
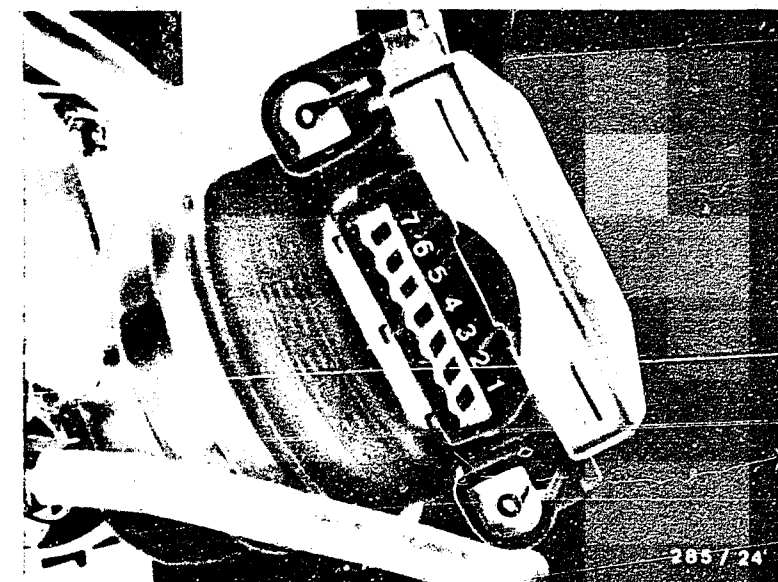
N>

Replacing throttle-valve positioner:

Disconnect all plugs from carburetor.
Remove carburetor.
Loosen fastening nuts (3) and remove throttle-valve positioner.
Install new throttle-valve positioner and re-mount carburetor. Plug all plugs onto carburetor.

Testing adjustment of throttle-valve section stage I

Switch of ignition.
Connect plug connection for CO adjustment.
Connect vacuum pump to evacuating valve and during adjustment generate a continuous pressure differential (approx. 250 mbar)(tappet of throttle-valve positioner goes to equilibrium position).
In this position, the feeler gauge (3.15 - 0.05 mm) must slide smoothly between the throttle-valve stop screw (center illustration 1 and the stop 2).
Adjust with new idle stop screw (lower illustration, 3) shear-head screw).
After adjustment break off shear-head screw.
Disconnect plug connection to CO adjustment.
Restore hose connections.



Continued on next picture page

SELF-DIAGNOSIS TROUBLE-SHOOTING PROGRAM (10) CONTINUED ()

SELF-DIAGNOSIS FLASH CODE 6 3
(continued)

Actuation of solenoid-operated
valve (evacuating) in throttle-
valve positioner:

Connect voltmeter to terms.
1 and 2 of throttle-valve
positioner plug (center
illustration).

Switch ignition on and then
off again.

After switching off the
ignition the voltage should
briefly exceed 10 V.

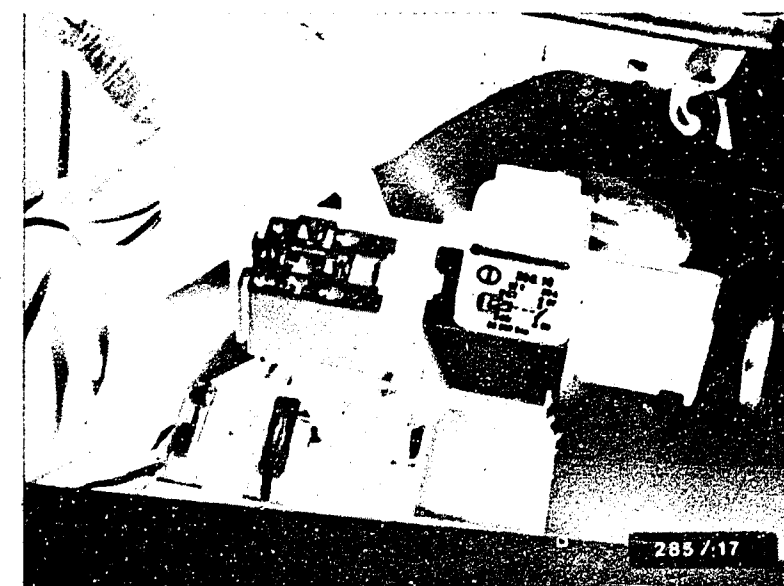
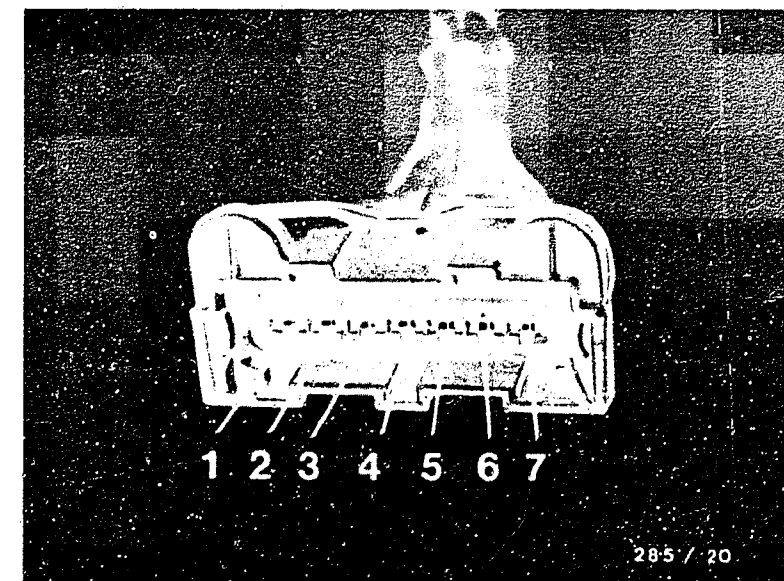
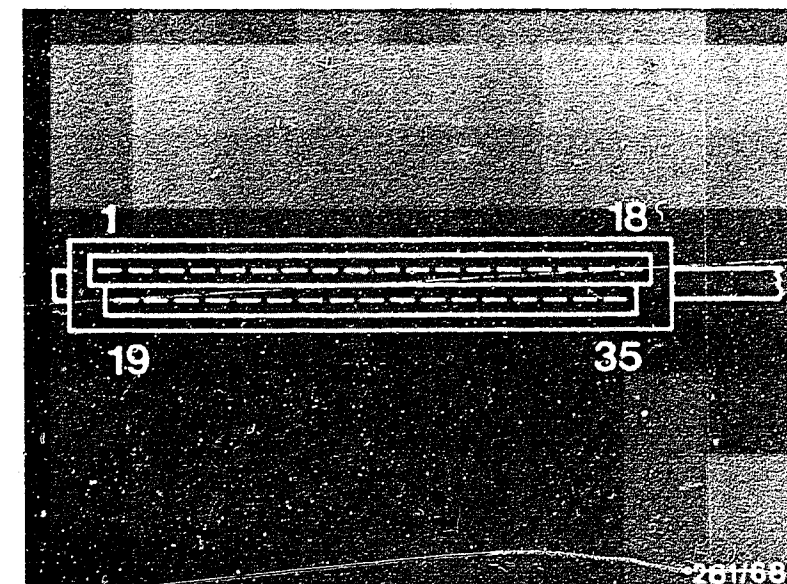
Is set value reached?

N>

Switch off ignition (wait 20
seconds) or disconnect
control relay.

Disconnect control-unit
plug (upper illustration).

Using ohmmeter, test leads
from control-unit plug term.
33 to throttle-valve
positioner plug (center
illustration) term. 1 and
from control relay (lower
illustration, green relay frame)
term. 87 to throttle-valve
positioner plug term. 2 for
short and open circuits.



Evaluation of the self-
diagnostics is completed.

If no fault was located using
the self-diagnostics, but
there is still a customer
complaint, proceed in accordance
with the trouble-shooting chart
starting at Coordinate B01 .

TROUBLE-SHOOTING PROGRAM (1)

Test fault lamp (engine indicator light:)

Switch on ignition, fault lamp (upper illustration, arrow) should light up.

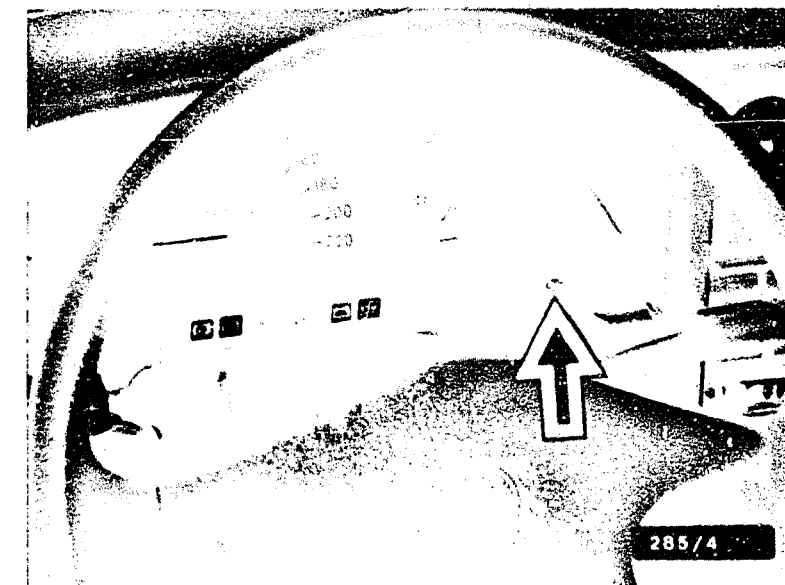
Does fault lamp light up?

N>

Disconnect control-unit plug, remove instrument panel.

Using ohmmeter, test lead from control-unit plug term. 30 to fault lamp and from the fault lamp to the central electrics for short and open circuits.

Replace fault lamp.
Eliminate short or open circuits in leads.



Return to trouble-shooting chart B01

C21

C22

TROUBLE-SHOOTING PROGRAM (2)

Test primary voltage with oscilloscope (motortester):

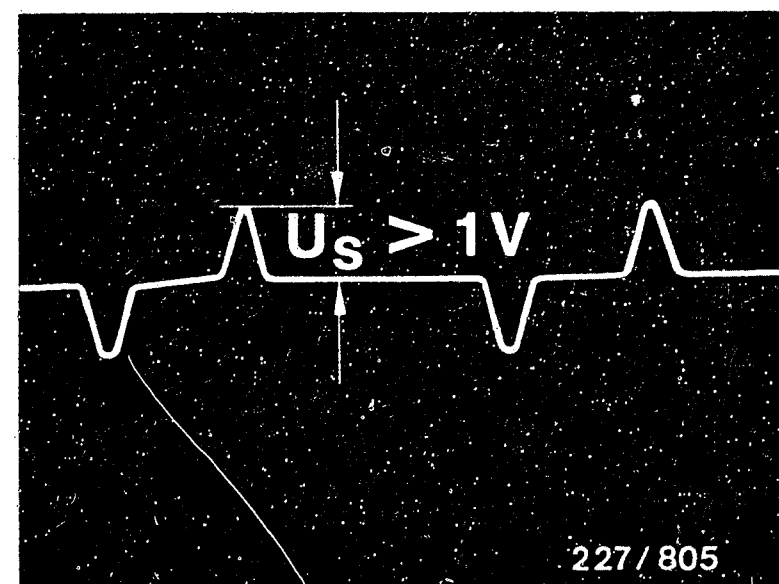
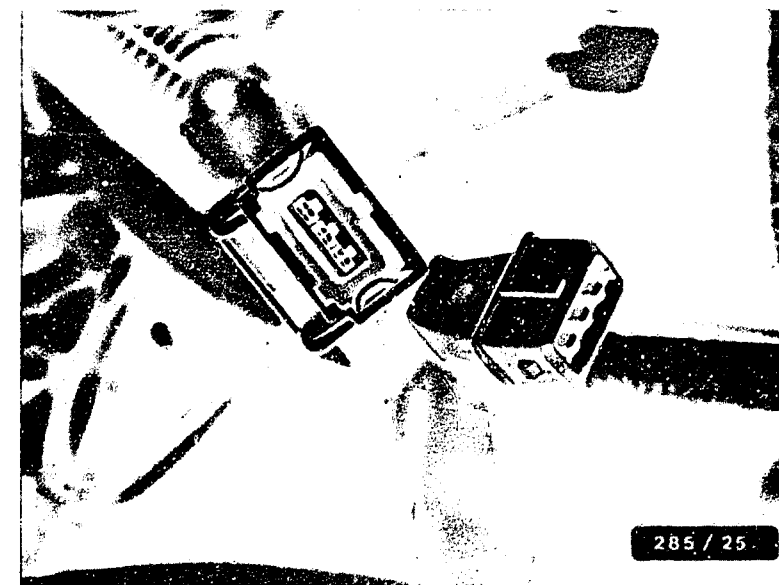
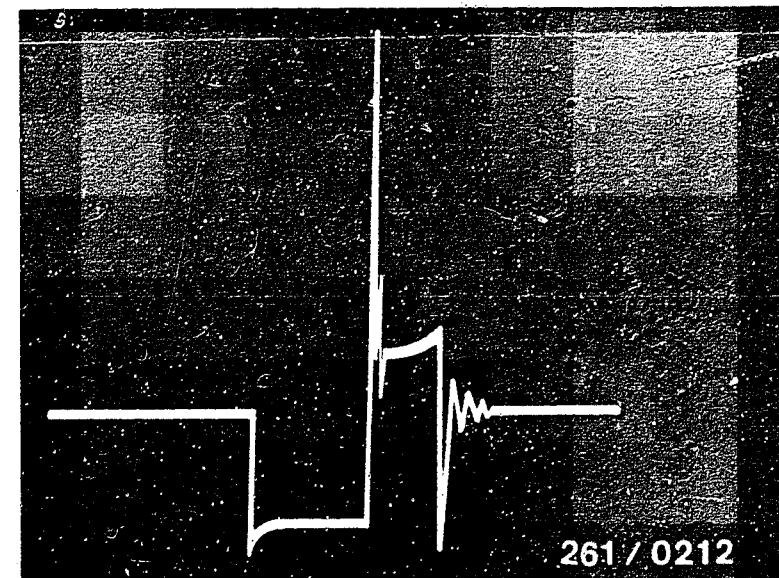
Connect motortester to ignition coil in accordance with operating instructions. Start engine.
Set value:
See upper illustration for primary signal.

Is primary signal present?

N>

Switch off ignition (wait 20 sec.).
Disconnect control-unit plug. Using oscilloscope (motor-tester special input) test term. 26 to term. 8 on control-unit plug: Start engine. Set value: see lower illustration (reference-mark sensor signal during starting procedure).
Test insulation resistance of reference-mark sensor: test resistance directly at plug pins of reference-mark sensor (center illustration), terms. 1 and 2 to ground: Set value: greater than 1 M Ω
Test winding resistance of reference-mark sensor: Using ohmmeter, test directly at plug pins of reference-mark sensor, term. 1 to term. 2:
Set value: see brief instructions.
Test leads from control-unit plug term. 26 and term. 8 to reference-mark sensor plug terms. 1 and 2 for short and open circuits.
Inspect installation of reference-mark sensor (visual check). Replace reference-mark sensor.
Test voltage at control-unit plug term. 1 to ground: Switch on ignition. Set value: greater than 10V (Prerequisite: (leads via ignition coil to term. 15 OK). Try replacing ignition coil as possible remedy.

Return to trouble-shooting chart B01



TROUBLE-SHOOTING PROGRAM (3)

V

Test HIGH-VOLTAGE SIDE:

Test spark plugs, spark-plug connectors, interference-suppression resistors, ignition cables, distributor cap, distributor rotor etc. for proper functioning (e.g. open circuits, shunt). Evaluate, for example, using ignition oscillogram, resistance measurement, and visual inspection.

Is the high-voltage side OK?

N>

Repair high-voltage side.

Y

V

Inspect mechanical coordination of high-voltage distributor:

Bring first cylinder to TDC. Distributor rotor should point to marking. Is high-voltage distributor correctly installed?

N>

Loosen fastening screws of high-voltage distributor.

Turn high-voltage distributor until distributor rotor points to marking. Tighten fastening screws.

Y

V

Return to trouble-shooting chart B01

TROUBLE-SHOOTING PROGRAM (4)

Test encoding strip or encoding plug for octane-number adaptation:

Using ohmmeter at control-unit plug test term. 25 to term. 35:

Set values:

For vehicles with encoding strip

95 RON: Approx. 0 Ω

91 RON: Greater than 1 M Ω

For vehicles with encoding plug

95 RON: Approx. 0 Ω

91 RON: Greater than 1 M Ω

Are set values reached?

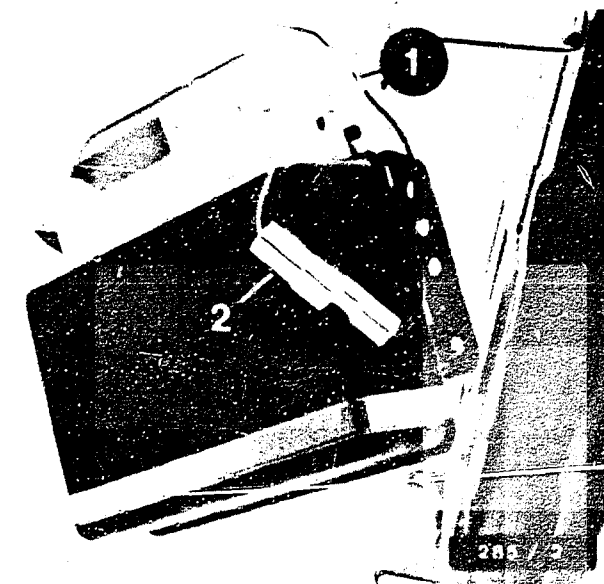
N>

With the help of the encoding strip or plug the ignition characteristic map can be adapted to the fuel used.

91 RON = Regular leaded or unleaded gasoline for vehicles without catalytic converter

95 RON = Premium unleaded gasoline

Note: For improved adaptation of the ignition map to the fuel quality, a 95/95 RON encoding plug can be installed.



Return to trouble-shooting chart B01

TROUBLE-SHOOTING PROGRAM (5)

V

Test fuel pressure:

Test fuel pressure with pressure/vacuum tester: Connect Y-connection piece to carburetor, fuel pump, and pressure/vacuum tester (make sure connections are tightly sealed). Start engine.

Set value: 0.1...0.3 bar

Is set value reached?

Y

V

Check fuel filter:

Pull fuel filter in supply line (upper illustration, arrow) out of supply fitting using M 3 screw.

Visual check.

Is filter dirty?

Y

V

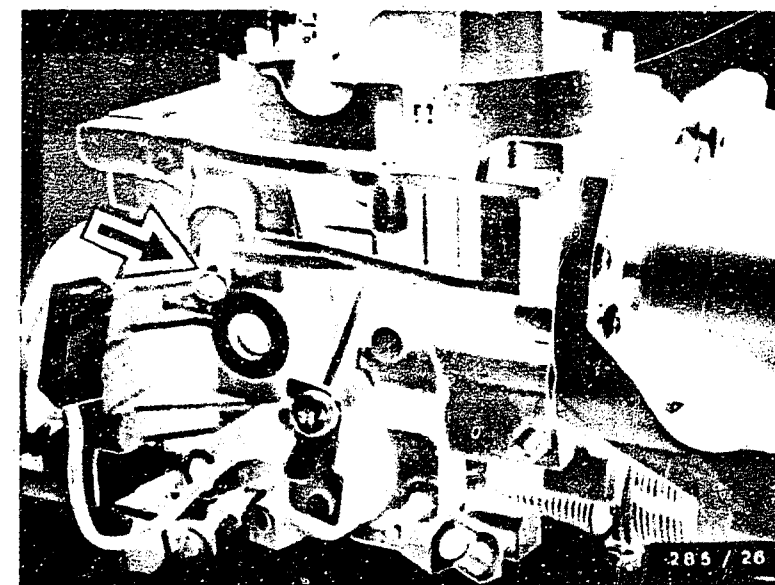
Return to trouble-shooting chart B01

N>

Check fuel-tank ventilation.
Check fuel pump.

N>

Clean fuel filter, if necessary replace.



TROUBLE-SHOOTING PROGRAM (6)

Test choke-valve plate, choke-valve actuator, and idle-air correction needle for ease of movement:

Switch off ignition. Unscrew air filter. Close choke-valve plate (upper illustration, arrow) by hand, while checking to make sure that the idle-air correction needle does not catch. The choke-valve plate must fully open again by itself. Does choke-valve plate open automatically?

N>

Idle-air correction needle stiff:

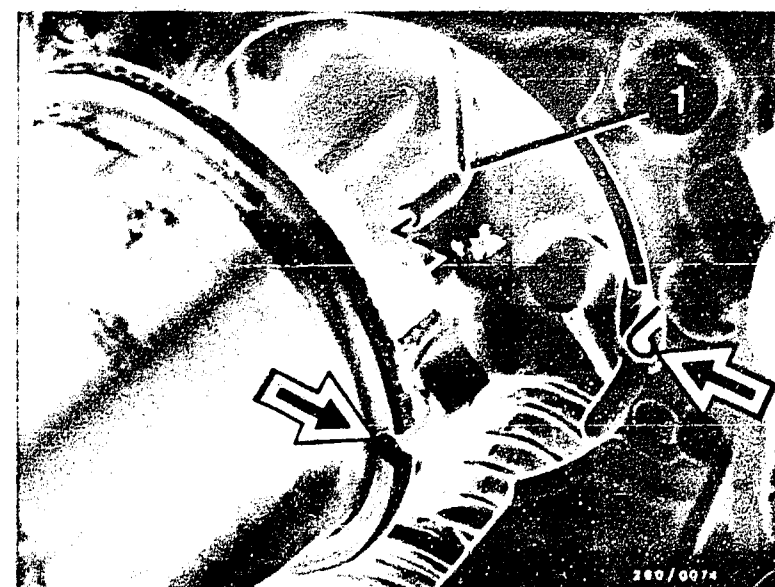
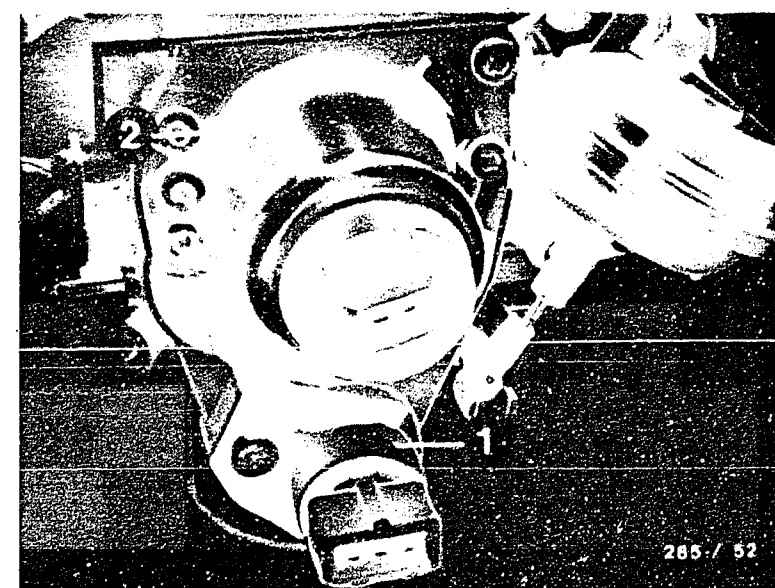
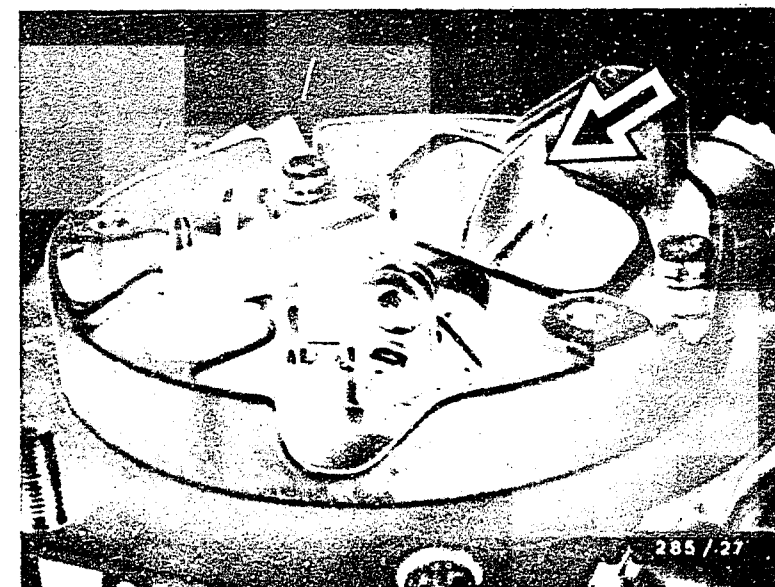
Remove throttle-valve potentiometer (center illustration, 1) making sure that the coupling does not fall out. Remove mounting with choke-valve actuator (upper illustration, 2). Loosen fastening screws for upper section of carburetor and remove section. Clean upper section of carburetor. Use new seals in re-assembly.

Choke-valve plate stiff:

Replace choke-valve actuator if stiff.

Free movement of connecting rod (lower illustration, 1) to choke-valve flap (e.g. with WD 40 or Unispray "Termal").
Never bend connecting rod!

When installing choke-valve actuator, make sure it engages (lower illustration, arrows), and be careful of the connecting rod (1) to the choke-valve plate.



Return to trouble-shooting chart B01

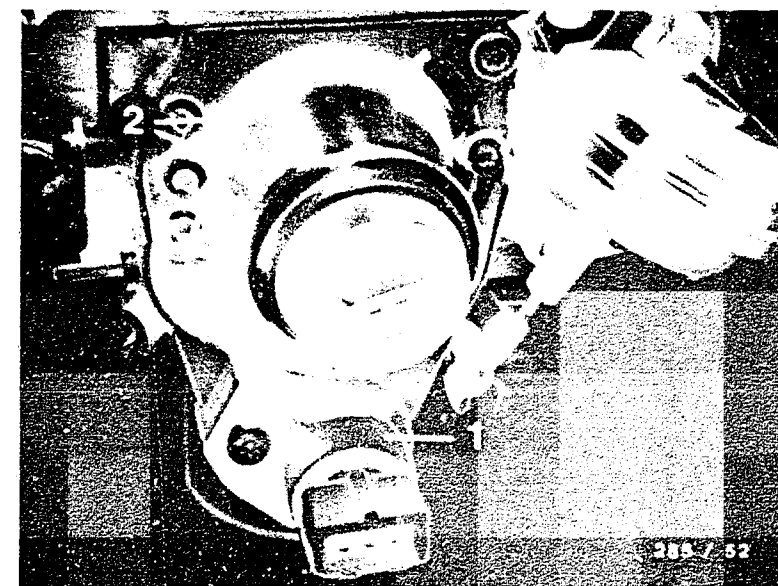
TROUBLE-SHOOTING PROGRAM (7)

Check float level:

Remove throttle-valve potentiometer (upper illustration, 1) and choke-valve actuator with mounting (upper illustration, 2). Loosen fastening screws (center illustration, arrows). Lift off upper section of carburetor. The fuel level cannot be adjusted; the proper level is attained by the use of a float in perfect condition. Float weight: See brief instructions.

Are float and float weight OK?

Replace float

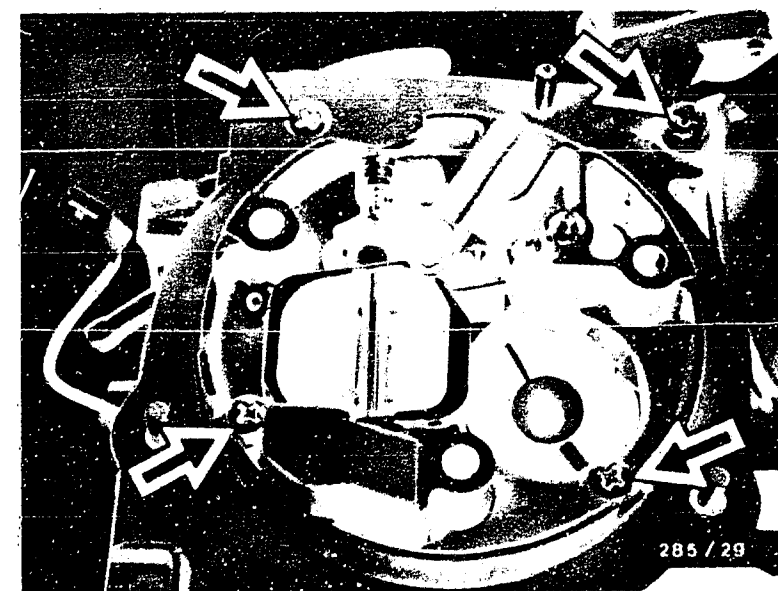


Check float needle:

Move float and check whether float needle functions properly. Does float needle function properly?

Check float needle valve for correct seating.

Replace float needle.



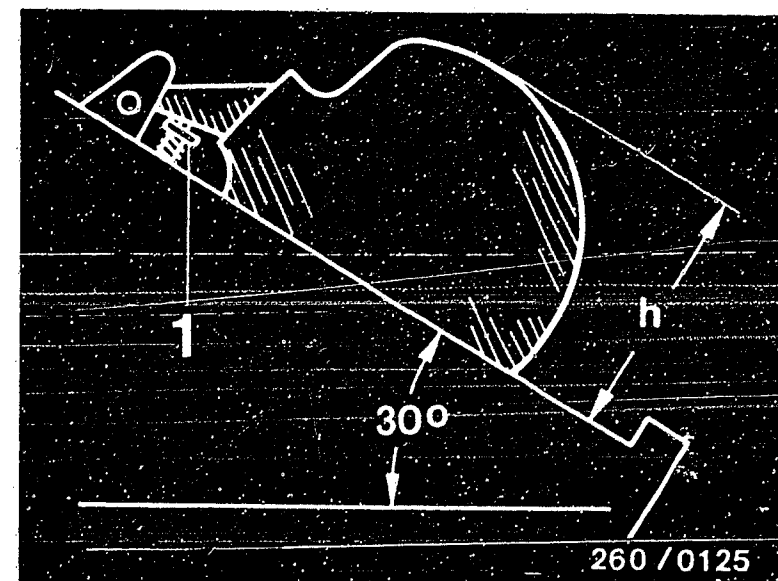
Check float level:

Lay upper section of carburetor on approx. 30° slope (lower illustration). The valve pin (1) of the float needle must not get stuck during measurement due to the weight of the float.

Level "h": See brief instructions. Is set value reached?

Check float needle valve for correct seating.

Replace float needle.



Return to trouble-shooting chart B01

TROUBLE-SHOOTING PROGRAM (8)

V

Inspect carburetor for corrosion and contamination:
Disconnect all plug connectors as well as hose lines where necessary from carburetor. Remove carburetor. Remove throttle-valve potentiometer (upper illustration, 1), making sure that the coupling does not fall out. Remove the choke-valve actuator with mounting (upper illustration, 2). Loosen the fastening screws for the upper section of the carburetor (lower illustration, arrows). Remove the upper section of the carburetor. Check carburetor for dirt and corrosion.

N>

No dirt in carburetor?

V

Return to trouble-shooting chart B01

Cleaning the carburetor:

Unscrew remaining electric components.
Remove all plastic parts (including the screen in the fuel supply line).

Clean die-cast and steel parts with a suitable carburetor cleaning agent.
After cleaning, wash all parts with white spirit (DIN 510632).

Blow compressed air through all holes and channels.
Make sure all moving parts possess freedom of movement.

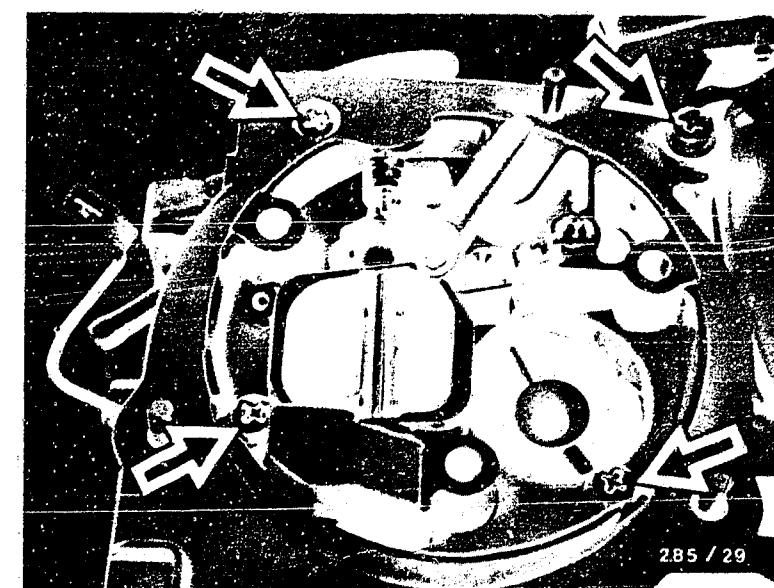
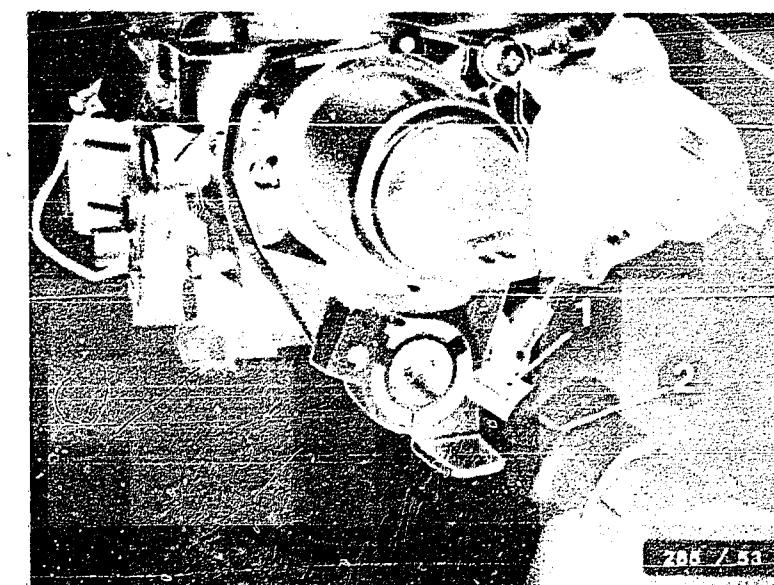
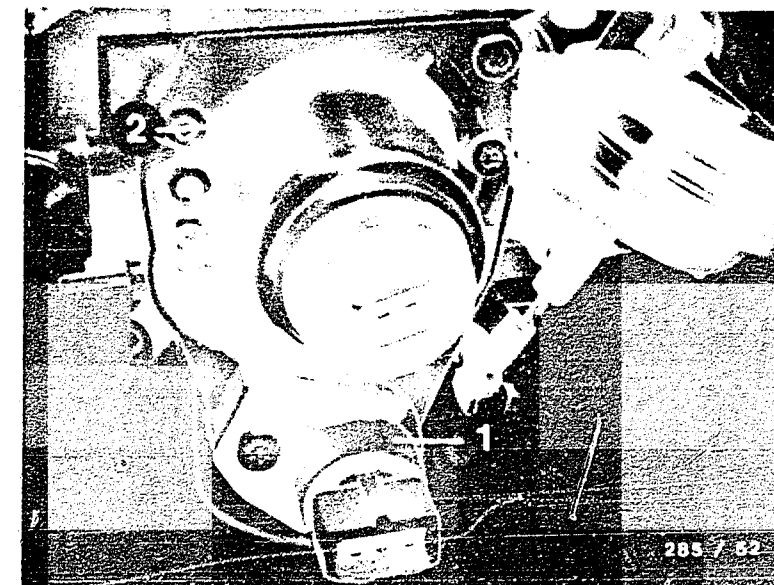
Assemble carburetor.

During assembly:

- *of the throttle-valve potentiometer (center illustration), be careful with the coupling (1) and detent (2).
 - *of the choke-valve actuator make sure the detent catches and connection is established with the choke-valve plate.
- Spray WD 40 or Unispray "Term-al" into carburetor to prevent corrosion.

Install carburetor. Tightening torque for fastening parts: see brief instructions. Restore all electrical connections and hose connections. Mount air filter.

Check idle CO level. If necessary, adjust with the idle-mixture-adjusting screw: see brief instructions.



TROUBLE-SHOOTING PROGRAM (9)

V

Test vacuum system for sealing (extraneous air):

N>

Visual check, or in cases of doubt as follows:

Unscrew air filter.

Seal upper section of carburetor with suitable covering (covering must have a small opening for the compressed-air gun).

If necessary, seal the exhaust.

Brush sealing points (carburetor flange, intake manifold, temperature sensor) with soapy water or spray with leak-detector spray (e.g., GUpoflex).

Combustible fluids must never be used for leak testing!

Using a compressed-air gun, blow air into the induction system through the opening in the cover. The throttle valve must be fully opened when this is done.

Bubbles or foam indicate leakage.

Is induction system sealed?

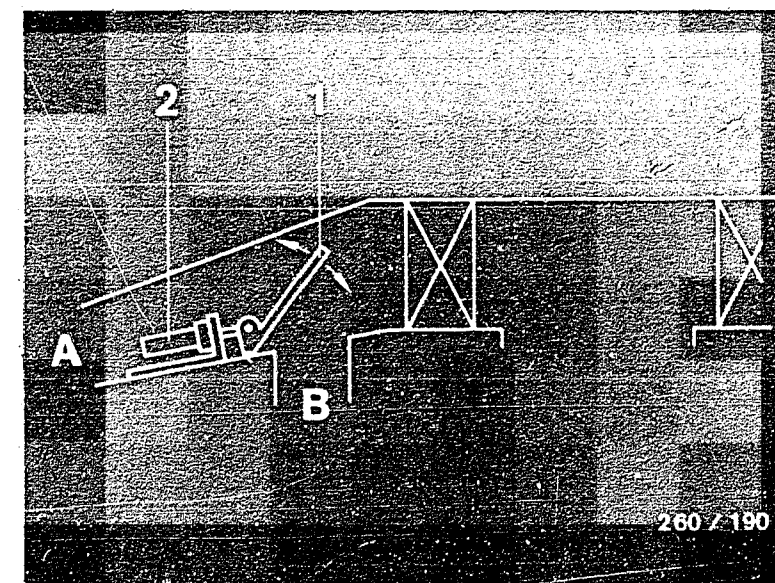
Y

V

Return to trouble-shooting chart B01

Eliminate any leaks in induction system.

Tightening torque for carburetor fastenings: see brief instructions.



260 / 190

TROUBLE-SHOOTING PROGRAM (10)

Test intake-air preheating:

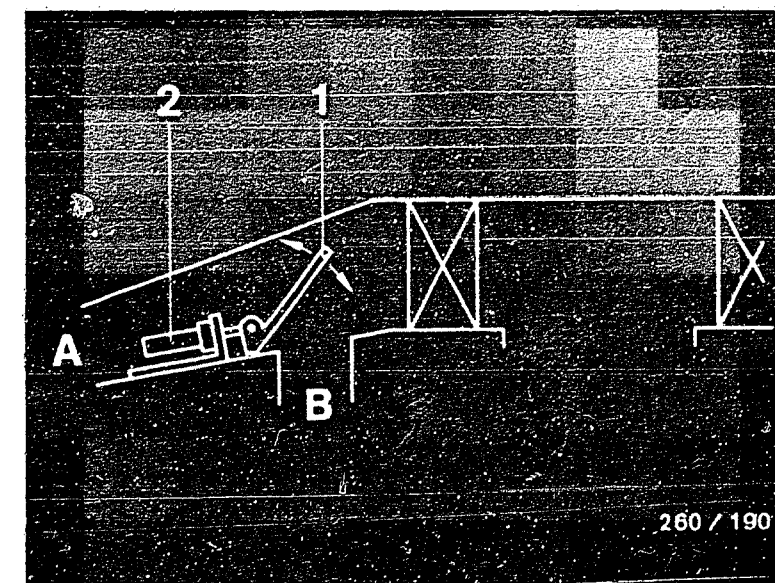
Intake air is regulated depending on loading and temperature.

Visual check: Regulator flap 1 must close the cold-air duct when the engine is cold (-20°C). If necessary, test expansion element 2 with refrigerant spray.

With a hot, running engine the hot-air duct must be closed.

Are set values reached?

Make sure that regulator flap can move freely



260 / 190

Return to trouble-shooting chart B01

D11

<=>

D12

<=>

TROUBLE-SHOOTING PROGRAM (11)

Check bypass heating:

Prerequisite: Ground lead between engine and chassis OK.

Connect voltmeter to supply lead for bypass heating element.

Switch on engine.

Set value: greater than 10 V

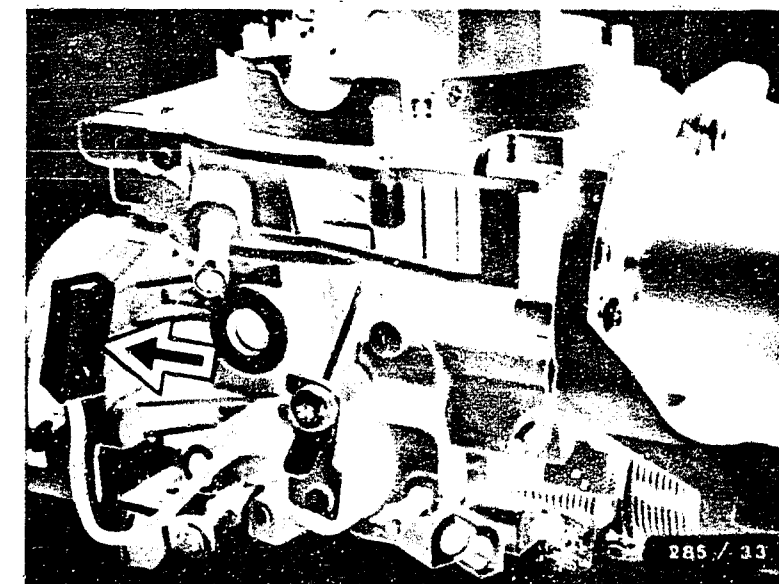
Is set value reached?

N>

Check fuse for bypass heating element.

Using ohmmeter, test lead from bypass heating element to central electrics for short and open circuits.

Eliminate short circuits, contact resistance, and open circuits in leads.



Test internal resistance of bypass heating element:

Connect ohmmeter between plug pin of heating element (upper illustration, arrow) and ground.

Set value: see brief instructions.

Is set value reached?

N>

Replace bypass heating element.

Return to trouble-shooting chart B01

TROUBLE-SHOOTING PROGRAM (12)

Test intake-manifold preheating:

Prerequisite: Ground lead between engine and chassis OK.
Engine temperature less than 60°C.

Connect voltmeter between supply lead for intake-manifold heating element and ground.
Switch on ignition.

Set value: see brief instructions.
Is set value reached?

N>

Test internal resistance of heating element for intake-manifold preheating

Connect ohmmeter between plug pin for heating element and ground.

Set value: see brief instructions.
Is set value reached?

N>

Return to trouble-shooting chart B01

Test intake-manifold heating relay (lower illustration, black relay frame) (visual check):

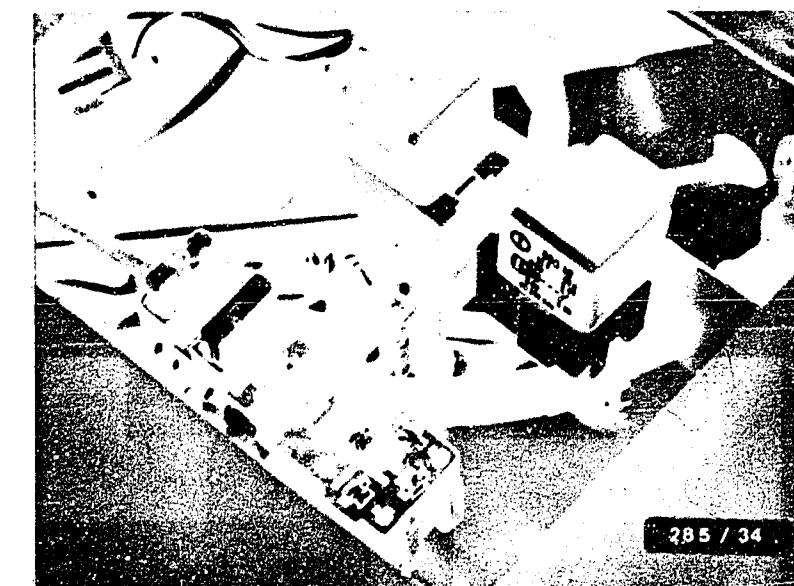
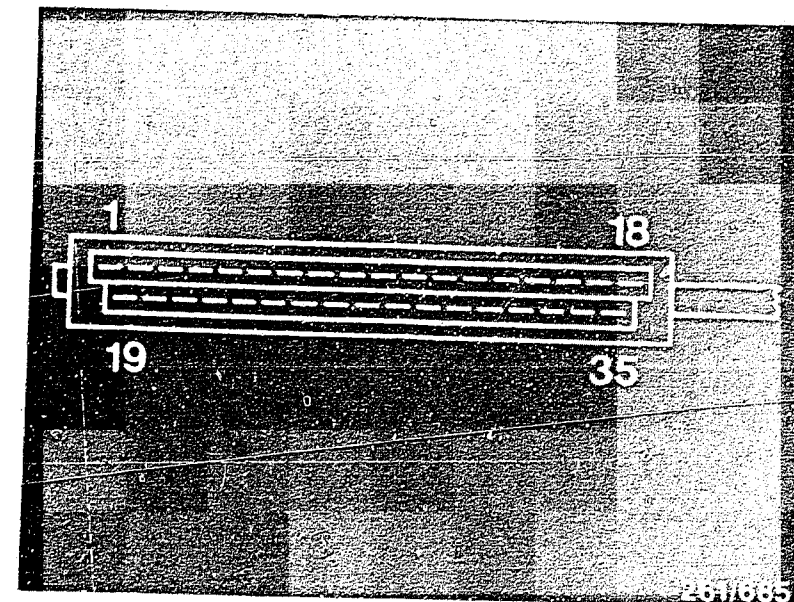
Is there corrosion or has a lead fallen off?

With voltmeter at plug base for intake-manifold-heating relay test term. 86 to ground:
Test specification: greater than 10V.

Using ohmmeter, test leads from relay frame term. 87 to intake-manifold heating-element plug and from relay frame term. 85 to control-unit plug (upper illustration) term. 3 for short and open circuits.

Eliminate short circuits, contact resistance, and open circuits in leads. Replace relay for intake-manifold heating.

Replace heating element for intake-manifold preheating.



TROUBLE-SHOOTING PROGRAM (13)

Check throttle shaft:

Check throttle shaft for excessive play (visual check).

Is throttle shaft OK?

Replace float housing.

Test adjustment of throttle-valve stage I:

Switch on ignition.
Connect plug connection for CO adjustment.
Connect vacuum pump to evacuating valve (center illustration, arrow) and during testing generate a constant pressure differential (approx. 250 mbar) (tappet of throttle-valve positioner goes to equilibrium position).
In this position the feeler gauge (3.15 ± 0.05 mm) must slide easily between the throttle-valve stop screw (upper illustration, 1) and the stop (2).

Is adjustment OK?

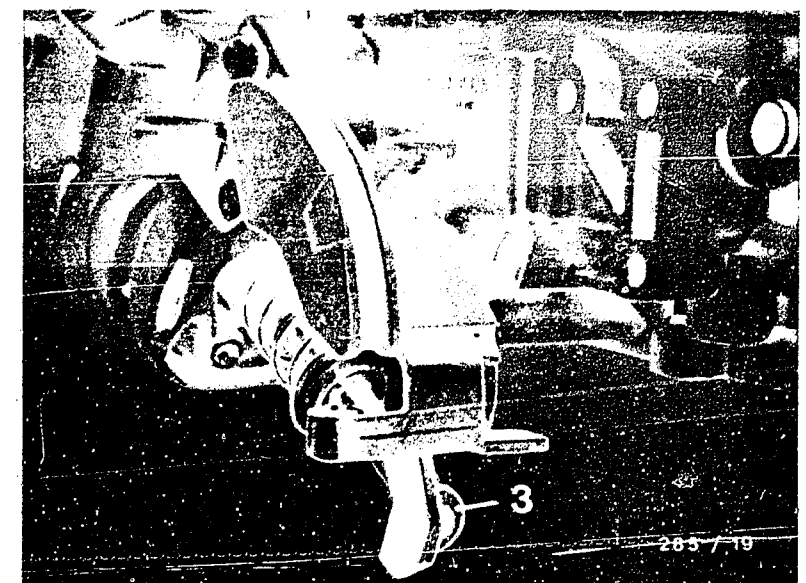
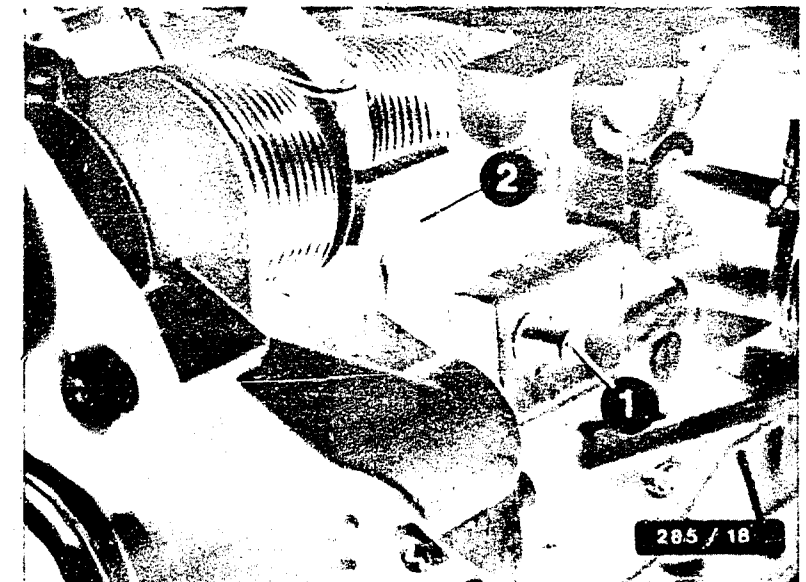
Unscrew idle stop screw (lower illustration, 3) shear-head screw).

Using a new idle stop screw, adjust throttle-valve section stage I.

Restore cable and hose connections. Disconnect the plug connection to CO adjustment.

Test idle.

Mount air filter.



TROUBLE-SHOOTING PROGRAM (14)

Test basic setting of throttle-valve, stage II:

Remove air filter.
Disconnect all plugs and, where necessary, hose connections from carburetor.
Remove carburetor.

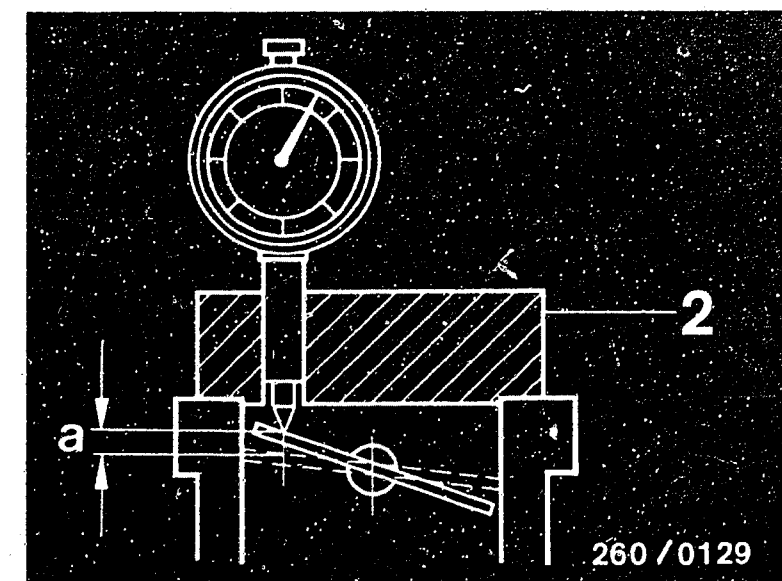
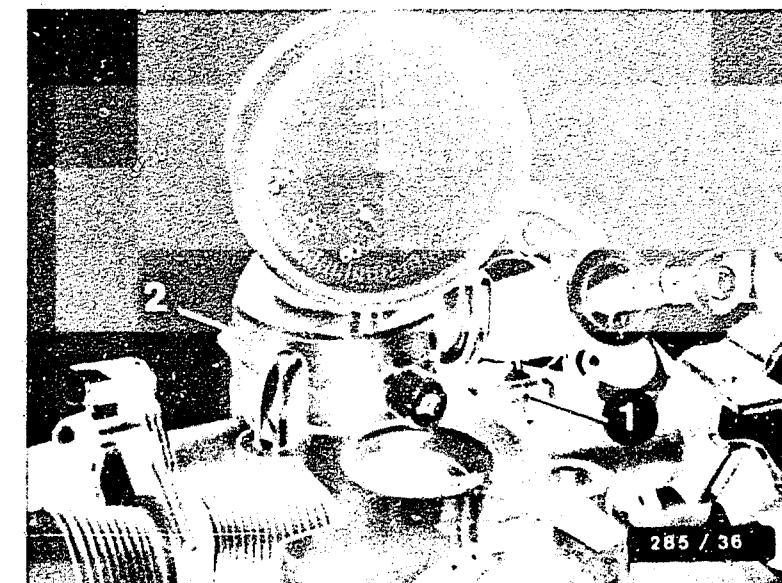
Unscrew throttle-valve stop screw (upper illustration, 1) until it is no longer resting against stop. Press throttle-plate lever lightly in direction of closing. Position measuring device (2). By turning the measuring device (2), determine the highest point of the throttle plate.

Set dial gauge to "0".
Using throttle-valve stop screw, set dimension "a" (see brief instructions).

Is set value reached?

N>

Replace float housing.



Return to trouble-shooting chart B01

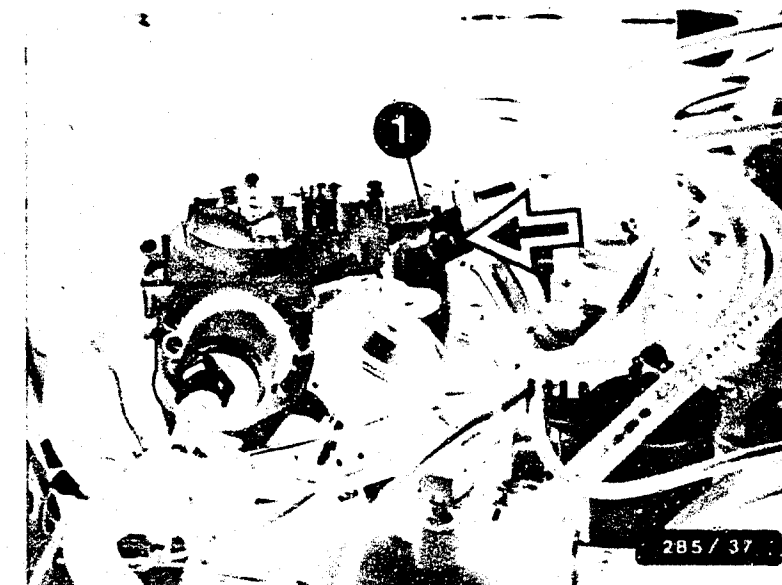
TROUBLE-SHOOTING PROGRAM (15)

Test accelerator actuation:

Let engine idle. Seal ventilating side of throttle-valve positioner (upper illustration, arrow). Switch off ignition. The tappet of the throttle-valve positioner will be pulled all the way back (overrun position). Check to see whether the throttle-valve stop screw is lying in contact with stop. Check whether the bowden cable (upper illustration, 1) has a slight amount of play. Is there any play?

N>

Adjust bowden cable so that there is a small amount of play.



Test vacuum unit stage II:

Check vacuum connection on carburetor for unobstructed passage. Connect vacuum pump to vacuum unit stage II. Generate a pressure differential of approx. 300 mbar. The pressure differential must not drop. Does the pressure differential remain steady?

N>

Clean vacuum connection on carburetor.
Replace vacuum unit stage II.

Return to trouble-shooting chart B01

TROUBLE-SHOOTING PROGRAM (16)

Test release and forced return of stage II:

Let engine idle. Seal ventilating side of throttle-valve positioner (upper illustration, arrow). Switch off ignition. The tappet of the throttle-valve positioner is retracted all the way (overrun position). Check to see whether the throttle-valve stop screw is at stop. Check clearances "Y" and "Z" (lower illustration):

Set values:
see brief instructions
(Measure at narrowest point).

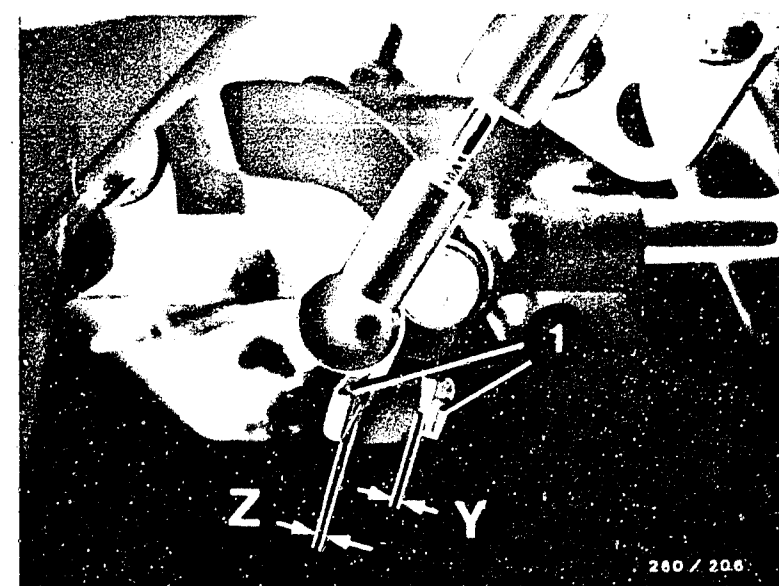
Are set values reached?

N>

Remove the carburetor for ease of handling.

Set clearances "Y" and "X" by bending the fork (1).

See brief instructions for tightening torques for mounting carburetor.



Return to trouble-shooting chart B01

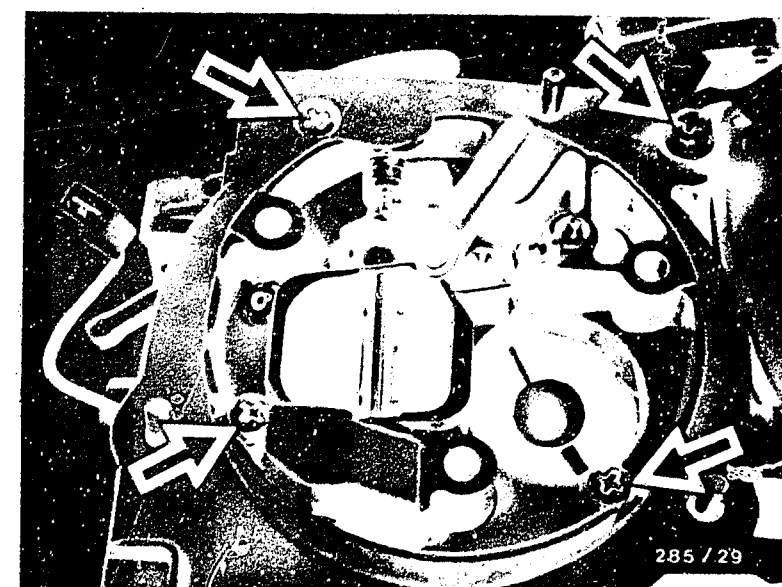
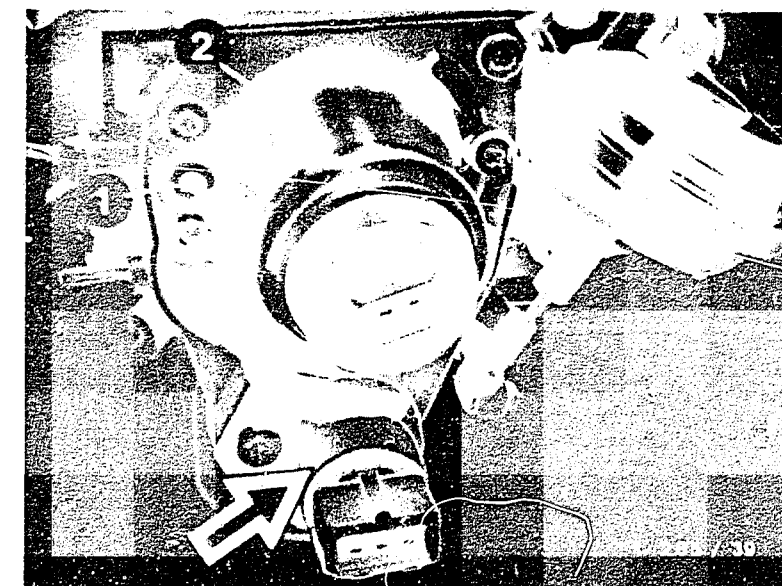
TROUBLE-SHOOTING PROGRAM (17)

Check nozzles:

Remove throttle-valve potentiometer (upper illustration, arrow) and choke-valve actuator with mounting (upper illustration, 1, 2). Loosen fastening screws (lower illustration, arrows). Lift off upper section of carburetor. Refer to brief instructions for correct nozzle type.

Are correct nozzles installed?

Install specified nozzles.



Return to trouble-shooting chart B01

TROUBLE-SHOOTING PROGRAM (18)

Test exhaust-gas recirculation valve:

(Only on Omega)

Let engine idle, and disconnect vacuum line on exhaust-gas recirculation valve (upper illustration, arrow).

Using hand vacuum pump

(Mityvac) generate a vacuum of 250 mbar.

The idle should get noticeably worse.

Does idle deteriorate ?

N>

Inspect vacuum hose and connection at carburetor, if necessary replace or clean.

Replace exhaust-gas recirculation valve.



Return to trouble-shooting chart B01

TROUBLE-SHOOTING PROGRAM (19)

↓

Test idle CO:

Note: The idle speed is regulated in a closed loop and cannot be adjusted.

Requirements:

- * Perfect functioning of engine.
- * Control unit and wiring harness must be OK.
- * Engine at operating temperature (oil temperature about + 70°C).
- * Induction system sealed. Clean air filter installed.
- * Electrical consuming devices switched off.
- * Crankcase-housing ventilation hose disconnected.
- * Induction-air preheating functioning properly.
- * Accelerator actuation correctly set.
- * Exhaust-gas recirculation OK.

Connect tachometer and CO tester in accordance with operating instructions.

Set values: see brief instruct.

Are set values reached?

↓

Trouble-shooting according to customer complaints is now completed. If no fault was found in the system during trouble-shooting, the engine may be mechanically defective (compression, timing, camshaft drive etc.)

CO-adjustment:

Adjust CO content with the idle-mixture-adjusting screw (upper illustration, arrow).

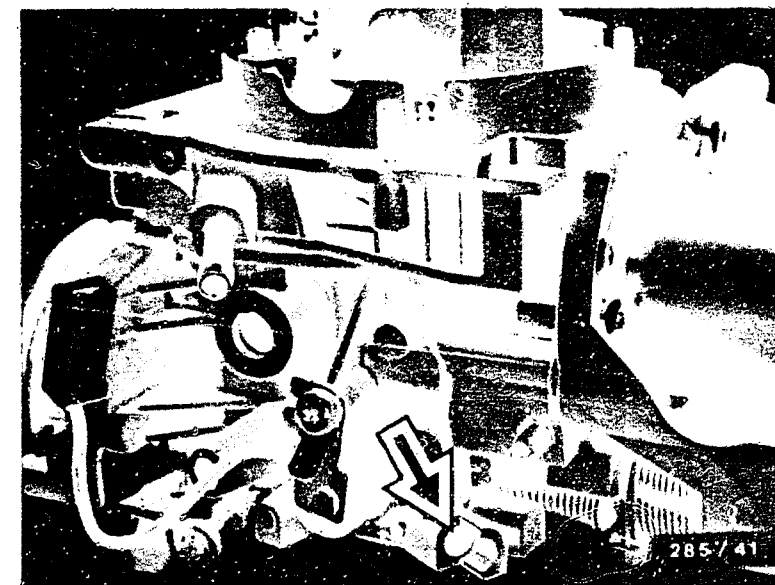
First set above set value and then adjust by screwing in.

Idle speed:

see brief instructions.

Set CO value:

see brief instructions.



INDEX	Coordinate		Coordinate
Air lines	A13	Carburetor	A07
CO-content adjustment	E01	Choke-valve actuator - Internal resistance	C01
Exhaust-gas recirculation	D27	- Insulation resistance	C01
Fuel pressure	D01	- Signal	C03
Generator with regulator	—	Choke-valve plate	D03
High-voltage distributor	C25	Control relay	A11
Intake-air preheating	D11	Control unit	A09
Leak testing	D09	Float - Level	D05
Nozzles, type installed	D25	- Height	D05
Reference-mark sensor - Internal resistance	C23	- Needle valve	D05
- Insulation resistance	C23	Ground connection	B21
- Signal	C23	Ignition coil	C23
Self-diagnosis (flashing code)	B05	Ignition signal	C23
Throttle shaft	D17	Octane number adaptation	C27
- Adjusting stage 1	D17	Temperature sensor - Intake manifold	A07
- Adjusting stage 2	D19	- Internal resistance	B19
Throttle-valve positioner		Temperature sensor - Coolant	A07
Potentiometer	B23	- Internal resistance	B13
Ventilating valve	C11	Vacuum unit, stage II	D21
Evacuating valve	C15		
Filter	D01		
Throttle-valve potentiometer	B15		

TABLE OF CONTENTS

Section	Coordinate
Structure of the microcard	A 01
Use of the microcard	A 01
Special features	—
Safety and precautionary measures	A 03
Test equipment and tools	A 05
Installation position of components	A 07
Diagram of air lines	A 13
Self-diagnosis	B 05
Trouble-shooting chart	B 01
Trouble-shooting programm	B 05
Index	N 25

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